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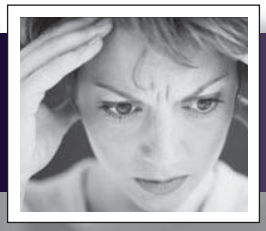
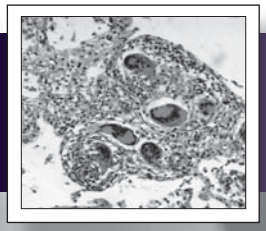

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Gestational Diabetes among Female Service Members in Relation to Body Mass Index Prior to Service, Active Components, U.S. Armed Forces, 1998-2007

Gestational diabetes mellitus (GDM) is defined as glucose intolerance first identified during pregnancy.[1] During the past 10 years, among women serving in active components of the U.S Armed Forces, the proportion of first pregnancies (according to military medical records) that were complicated by GDM has more than doubled, from 3.3 to 8.1 percent. This may be associated with improved screening for GDM, increasing maternal age at first pregnancy, documented increases in the proportions of non-white female service members and/or the rising prevalence of service members with a history of overweight. Between 1996 and 2006, the percentage of 18-year-old female applicants who were nominally overweight (BMI≥25) climbed from 19% to 28%.[2]

Maternal obesity is the most important modifiable risk factor for GDM.[3] Several studies have suggested that excessive pre-pregnancy weight and weight gain prior to pregnancy increase GDM risk.[4-8] This report seeks to determine the relationship between body mass index prior to military service and GDM during a service member's first documented pregnancy. In addition, outpatient diagnoses of overweight that occurred prior to first pregnancies are assessed in relation to subsequent GDM diagnoses.

Methods:

The surveillance period was January 1998 to December 2007. The surveillance cohort was comprised of females 17 to 49 years of age with (a) height and weight measurements recorded at their initial visit to a Military Entrance Processing Station prior to service and (b) a medical encounter that documented a "live birth" while serving in an active component of the U.S. military. Live births were ascertained from standardized records of medical encounters that included one or more of the following ICD-9-CM diagnosis codes: V27.0, V27.2, V27.3, V27.5, V27.6 or 650 and 651-669 with a fifth digit of 1 or 2 (indicating "delivered").

The 280 days preceding the first live birth during military service of each surveillance cohort member was considered the likely period of gestation for the first live birth ("first pregnancy"); only first pregnancies were considered for this analysis. Service members with any diagnosis of "diabetes

Table 1. Gestational diabetes mellitus (GDM), by BMI group, during pregnancies that resulted in a first live birth, active female service members, 17-49 years of age, U.S. Armed Forces, 1998-2007

	BMI 0-19 (n=13,723)		BMI 20-24 (n=45,268)		BMI 25-29 (n=15,364)		BMI 30+ (n=505)	
	No. with GDM	% with GDM	No. with GDM	% with GDM	No. with GDM	% with GDM	No. with GDM	% with GDM
Total (1998-2007)	692	5.04	2,331	5.15	1,046	6.81	49	9.70
Age								
17-20	43	3.28	127	3.15	48	4.18	2	10.53
20-24	396	4.33	1,272	4.36	545	5.55	19	7.04
25-29	180	7.05	653	7.21	306	9.26	17	12.41
30-34	61	9.82	216	8.55	111	12.47	9	14.29
35-39	12	13.19	58	12.89	34	17.35	2	14.29
40-49	.	0.00	5	11.63	2	13.33	.	0.00
Race/ethnicity								
White, non-Hispanic	329	5.48	1,144	5.19	464	6.66	18	8.82
Black, non-Hispanic	200	4.11	561	4.39	285	6.12	17	7.91
Hispanic	67	4.27	314	5.20	165	7.24	9	21.43
Asian/Pacific Islander	57	8.74	160	8.53	54	8.77	4	16.67
Native American/Alaskan Native	10	4.26	62	6.00	41	9.36	.	0.00
Other	29	7.23	90	6.05	37	9.09	1	14.29
Service								
Army	210	4.42	778	5.04	396	6.79	31	10.73
Navy	181	5.49	533	5.03	460	7.09	17	8.95
Air Force	234	5.35	795	5.55	144	5.96	.	0.00
Marine Corps	56	4.87	171	4.03	23	6.95	.	0.00
Coast Guard	11	7.59	54	7.79	23	7.85	1	8.33
Grade								
Enlisted	650	4.94	2,165	5.08	992	6.70	47	9.71
Officer	42	7.32	166	6.31	54	9.78	2	9.52

mellitus" or "abnormal glucose tolerance" prior to the first pregnancy were assumed to have a history of diabetes and were excluded from this analysis.

For surveillance purposes, a case of GDM was defined as (a) an inpatient or outpatient diagnosis (in any position) of ICD-9-CM: 648.0 "diabetes mellitus, complicating pregnancy" or (b) an inpatient diagnosis (in any position) or at least 2 outpatient encounters at least 7 days apart of ICD-9-CM: 648.8 "abnormal glucose tolerance, complicating pregnancy". A diagnosis of "overweight" during service was defined as two or more outpatient encounters with ICD-9-CM: 278.0 "overweight and obesity" and/or V85.2 through V85.4 "body mass index ≥25" in any diagnostic position that occurred prior to the first pregnancy.

Results:

During the 10 years between 1998 and 2007, 74,860 female service members had records of a first live birth while serving in an active component **(Table 1).** Based on pre-service body mass indexes (BMI), for purposes of this analysis, most were classified as "underweight" (BMI≤19; 18.3%) or "normal weight" (BMI=20-24; 60.5%) prior to service; however, more than one in five were classified as "overweight" (BMI=25-30; 20.5%) or "obese" (BMI>30; 0.67%) prior to service **(Table 1)**.

The overall percentage of first pregnancies with documented gestational diabetes was 5.50% **(Table 1).** However, prevalences of GDM monotonically increased in relation to increasing BMI prior to service. Among service members with pre-service BMI classifications of "underweight", "normal weight", "overweight" and "obese", the percentages of pregnancies with GDM (unadjusted) were 5.04%, 5.15%, 6.81% and 9.70%, respectively **(Figure 1).**

Overall, as well as in each BMI-defined subgroup, GDM risk increased with age. For example, in each BMI-defined subgroup, women younger than 25 years old were much less likely than those older to be diagnosed with GDM **(Figure 1).**

As compared with white non-Hispanic and black non-Hispanic service members, those of "other" racial/ethnic groups had higher percentages of pregnancies with gestational diabetes **(Figure 2)**. Asians/Pacific Islanders had the highest prevalences of GDM among service members who were not overweight prior to service **(Figure 3, Table 1)**. Native American/Alaskan and Hispanic service members showed the greatest relative increase in GDM risk in relation to increasing pre-service BMI. As compared to underweight or normal weight, being overweight or obese prior to service increased GDM risk during the first pregnancy by approximately 50% and 65% for Hispanic and Native American/Alaskan service members, respectively **(Figure 3)**.

Figure 1. Gestational diabetes by body mass index prior to service and age at first pregnancy, females 17-49 years, active components, U.S. Armed Forces, 1998-2007

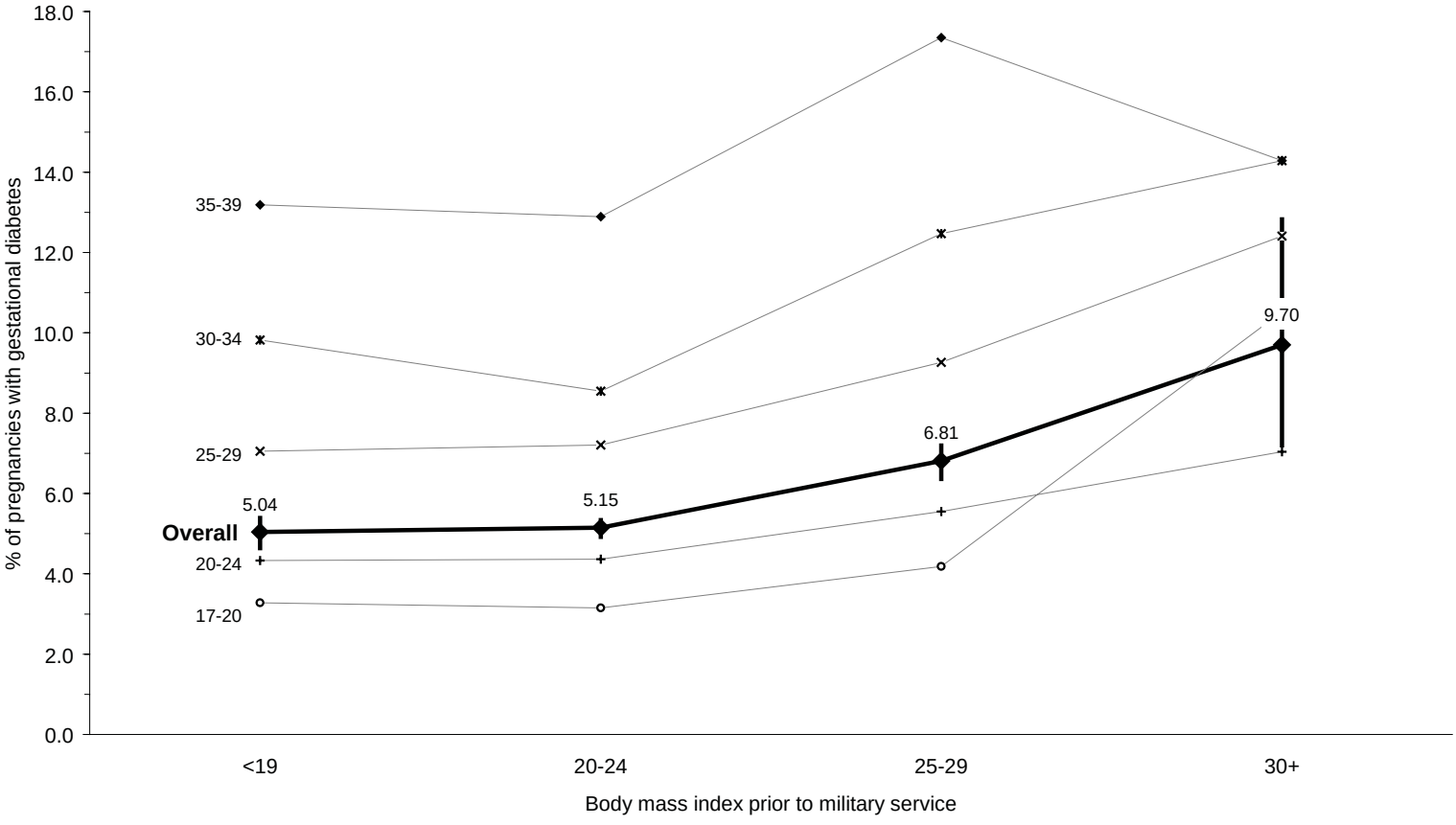
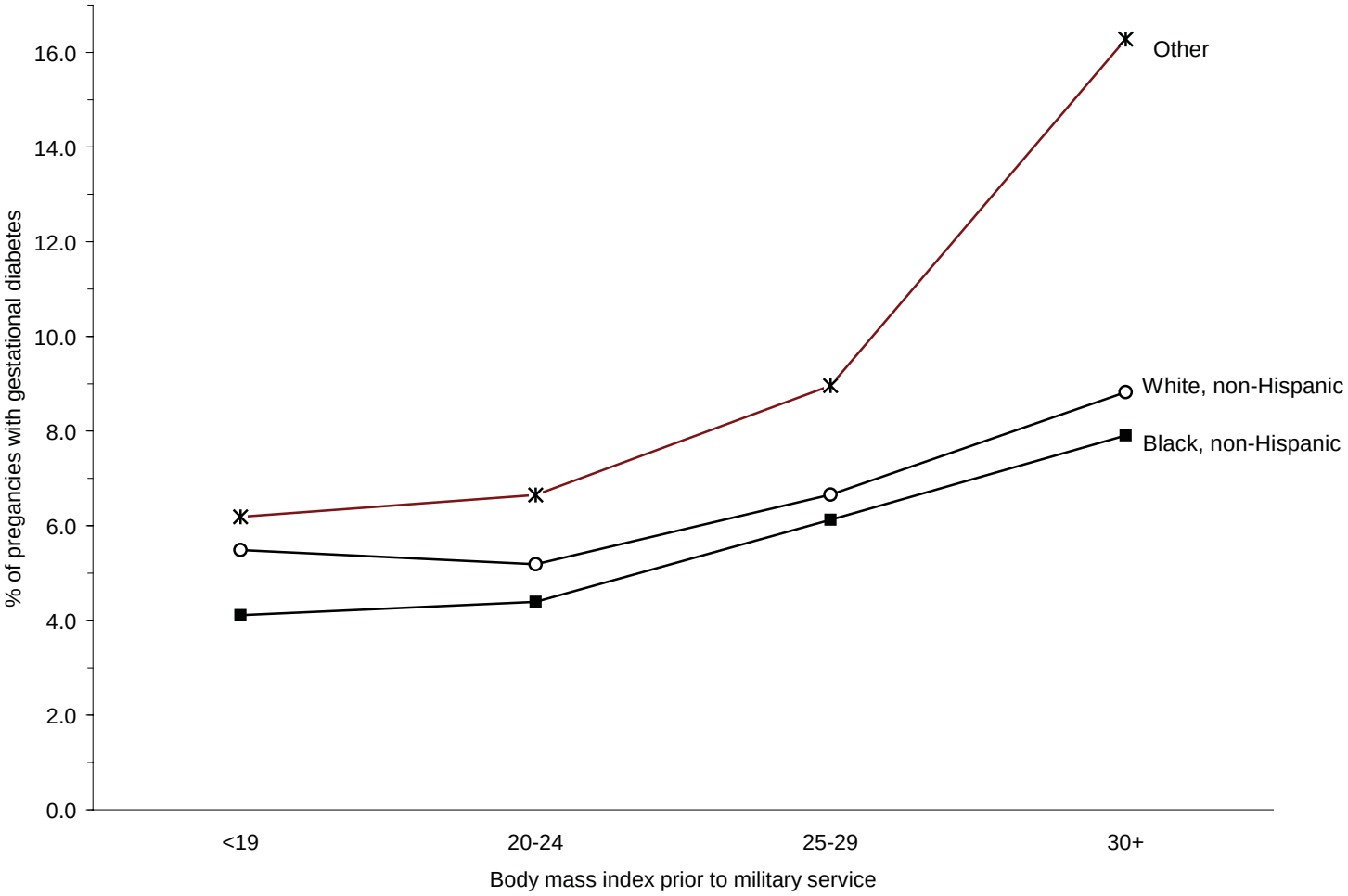


Figure 2. Gestational diabetes by body mass index prior to service and racial/ethnic group, females 17-49 years, active components, U.S. Armed Forces, 1998-2007



During the 10-year period, fewer than one of 40 (n=1,785; 2.4%) of all cohort members had one or more outpatient diagnoses of overweight or obesity prior to first pregnancies during service. The percentage of these women with GDM was 11.09% – more than twice as high as the percent (5.36%) among those with no outpatient diagnoses of overweight before pregnancy (data not shown).

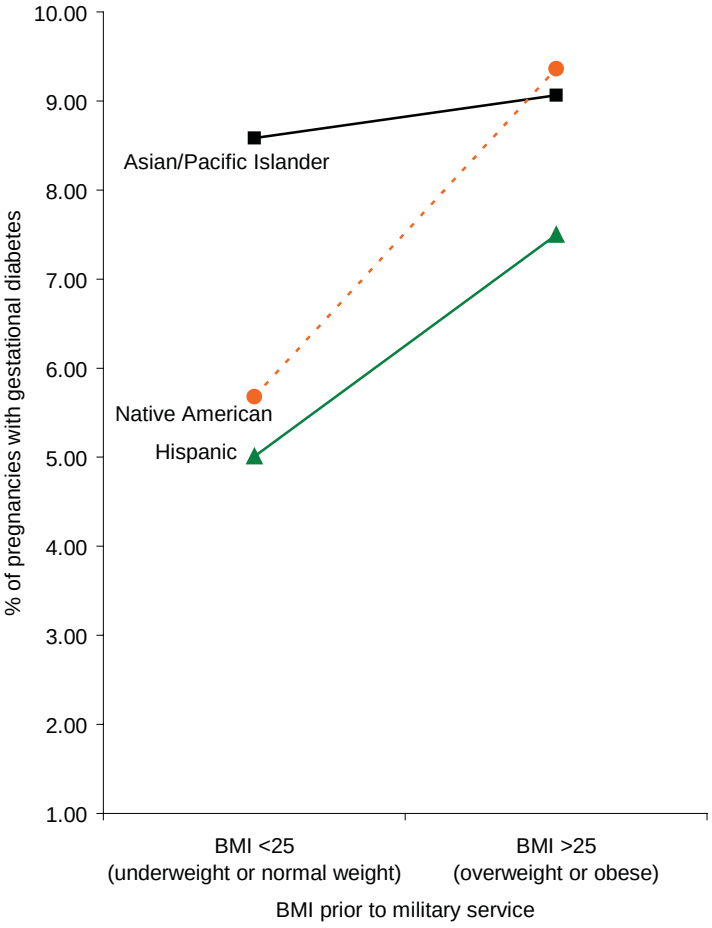
Data analysis by Gi-Taik Oh, MS, MA.

Editorial comment:

This summary documents that female service members who were nominally overweight prior to military service are more likely than their counterparts to develop gestational diabetes during their first pregnancies in service. In addition, active component members who have received outpatient diagnoses of "overweight" before the beginning (estimated) of pregnancies have approximately twice the GDM risk as those with no pre-pregnancy overweight diagnoses. These findings from surveillance of generally healthy, physically active, young adult service members are consistent with findings from more rigorous studies in other populations and settings.[4-8] For example, Hedderson and colleagues recently reported that women who were overweight or obese during the five years prior to pregnancy had twice the GDM risk of their normal weight counterparts.[4]

Several limitations should be considered when interpreting the results of this report. For example, the validity of the heights and weights used to calculate pre-service BMIs is unknown. Some applicants for military service may temporarily reduce their weights from normal levels for the "pre-employment" medical examination; if so, the reported BMI may not accurately reflect the pre-service height-weight status. In addition, differences in times between the pre-service BMI and the first "full term" pregnancy in military service were not accounted for in this analysis. If the relationship between pre-service BMI and subsequent GDM risk is not constant throughout the time of military service, then estimates of the strengths of these relationships may be biased (particularly, among older service members who are likely to have longer periods of service). Also, this and other reports document differences in GDM risk in relation to age, race-ethnicity, and

Figure 3. Gestational diabetes by ethnic groups and body mass index prior to service, females 17-49 years, active components, U.S. Armed Forces, 1998-2007



history of obesity. However, the independent risks associated with these factors while accounting for the effects of the other factors in the same analysis were not estimated for this report. The natures and strengths of the inter-relationships between age, race-ethnicity, obesity, and likely other factors (e.g., diet, exercise) on overall risk of GDM should be the focuses of future studies. Finally, surveillance reports such as this rely on data that are routinely reported to medical administrative databases. In turn, the completeness and accuracy of diagnoses of "gestational diabetes" are unknown. While it is unlikely that all GDM cases were ascertained for this report, for health surveillance purposes, the findings are interesting, informative, and potentially useful.

All military members must maintain prescribed levels of physical fitness. As weight in relation to height is a criterion for accession to and continuation of military service, it is assumed that the majority of overweight applicants were no longer overweight by the time they became pregnant as active service members. This analysis did not attempt to assess whether weight loss prior to a pregnancy could alter the risk of GDM during a subsequent pregnancy. Previous studies [4,6,7] have not found that weight loss prior to pregnancy reduced GDM risk during pregnancy, however, in these studies, the numbers of women who lost weight prior to pregnancy were relatively small.

In summary, among women in the U.S. military, risk of gestational diabetes is strongly related to weight relative to height prior to service. It is unclear that increasing physical fitness and/or losing weight after entering service significantly modifies preexisting GDM risk. Thus, the trend of increasing obesity among adolescents and young adults in U.S. general populations has implications regarding the health of military women – in general and specifically related to GDM risk during pregnancy. The military should be a strong advocate for public health measures that are designed to improve the diets and increase the fitness of future military members.

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Migraine and Other Headaches, Active Components, U.S. Armed Forces, 2001-2007

Migraine is a neurovascular syndrome that is generally manifested as recurrent, severe headaches that can be debilitating. Migraine headaches are typically throbbing, localized, and very painful. During migraine attacks, affected service members may not be able to perform their military duties.

Migraines are often distinguishable from other types of headaches by characteristic symptoms such as nausea, increased sensitivity to light and sound, and dizziness. Migraines are often preceded by neurologic symptoms ("migraine aura") which may include blurred or obstructed vision, skin numbness or tingling, exaggerated responses to painful stimuli, and momentary loss of consciousness (syncope).[1,2]

In general, migraine is more common among females and young adults than their respective counterparts. In non-military populations, prevalences of migraine have been estimated as approximately 6% among males and 18% among females between 18 and 65 years old.[3-5] There may be a genetic predisposition to migraine, but the factors that predispose individuals to migraine are not completely understood.[4]

In 2002, "headaches" accounted for approximately 1.6% of all illness and injury-related "lost duty time" among U.S. military members.[6] A recent survey of 741 U.S. Army officer trainees found that approximately one of seven (14%) males and one of three (31%) females had "definite migraine" during the preceding 12 months.[7] Among officer trainees with histories of migraine, relatively few had been diagnosed with migraine, and most had used nonspecific, over-the-counter drugs only for treatment.[7]

Because of the relatively high prevalence of migraine among otherwise healthy young adults, the frequent sudden onset, and the potential for incapacitation, migraines (and headaches in general) have significant impacts on the health and well-being of affected service members, the operational effectiveness of their units, and military health care costs overall.

This surveillance report documents the incidence, prevalence, and trends of migraine and other headache diagnoses among members of the active component of the U.S. military from 2001 to 2007. It also summarizes the number of outpatient visits and estimates lost-duty time associated with migraine during the period.

Methods:

The surveillance period was 1 January 2001 through 31 December 2007. The surveillance population included all individuals who served in an active component of a U.S. military service any time during the surveillance period.

For each calendar year, the period prevalence of migraine was estimated as the proportion of individuals in active service at the start of the year who received a hospital discharge diagnosis and/or a primary (first-listed) outpatient

Table 1. Number and period prevalence (%) of service members who received a hospital discharge or primary outpatient diagnosis of migraine, by year, active components, U.S. Armed Forces, 2001-2007

	Migraine													
	2001		2002		2003		2004		2005		2006		2007	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sex														
Female	8,361	4.12	8,839	4.25	9,732	4.55	10,849	5.03	10,666	5.08	10,657	5.31	10,477	5.19
Male	8,762	0.74	8,998	0.75	9,656	0.79	10,581	0.86	10,656	0.87	10,829	0.91	11,486	0.96
Age group														
17-24	6,426	1.12	6,972	1.18	7,696	1.27	8,442	1.37	7,989	1.33	7,653	1.36	7,815	1.37
25-34	6,346	1.32	6,325	1.33	6,878	1.41	7,819	1.57	8,073	1.59	8,353	1.65	8,636	1.69
35-44	3,815	1.28	3,928	1.33	4,148	1.40	4,465	1.55	4,483	1.60	4,696	1.71	4,766	1.75
45+	536	1.27	612	1.40	666	1.44	704	1.50	777	1.62	784	1.65	746	1.55
Service														
Army	6,276	1.33	6,423	1.35	6,617	1.36	7,591	1.56	7,680	1.57	7,580	1.58	8,203	1.62
Navy	3,615	0.99	4,036	1.08	4,558	1.21	4,906	1.31	4,918	1.35	4,999	1.43	4,859	1.43
Air Force	5,974	1.71	6,129	1.75	6,713	1.86	7,338	1.97	6,924	1.91	7,019	2.04	6,943	2.04
Marine Corps	1,021	0.60	996	0.58	1,092	0.63	1,152	0.65	1,332	0.75	1,339	0.76	1,377	0.77
Coast Guard	237	0.68	253	0.71	408	1.09	443	1.15	468	1.20	549	1.40	581	1.45
Grade														
Enlisted	15,295	1.31	15,980	1.35	17,347	1.44	19,170	1.58	18,950	1.58	19,029	1.64	19,549	1.67
Officer	1,828	0.82	1,857	0.83	2,041	0.89	2,260	0.97	2,372	1.01	2,457	1.07	2,414	1.05
Total	17,123	1.23	17,837	1.27	19,388	1.35	21,430	1.48	21,322	1.49	21,486	1.55	21,963	1.56

diagnosis of migraine (ICD-9-CM code 346.xx) or headache (migraine plus ICD-9-CM codes 784.0x and 307.81) during the year, regardless of each individual's prior history.

The annual incidence rate of migraine was estimated as the number of first-ever diagnoses of migraine among active component service members divided by the total person-time at risk. Person-time at risk was calculated as the total time of non-deployed military service by active component members who had no previous diagnosis of migraine.

The annual incidence of outpatient visits for migraine was calculated as all outpatient visits with migraine-specific diagnoses divided by the total of all person-years of non-deployed military service by active component members during each calendar year.

To quantify the military operational and health care impacts of migraine, the estimated number of lost-duty days due to migraine was divided by the total of lost-duty days due to all illnesses and injuries. "Lost-duty days" were estimated as total bed-days during hospitalizations; plus all outpatient visits with "convalescence in quarters" dispositions (i.e., one day of lost duty per visit); plus one-half of all outpatient visits with "limited duty" dispositions (i.e., one-half day of lost duty per visit).[6]

Results:

During each year, approximately one of 20 females (range, % per year: 4.12-5.31) and fewer than one of 100 males (range, % per year: 0.74-0.96) received at least one diagnosis of migraine. Migraines represented one-half of all headache diagnoses affecting females and one-third of the headache diagnoses affecting males. In general, females compared to males were 5-6-times more likely to receive a migraine diagnosis and approximately 4-times more likely to receive any headache diagnosis **(Tables 1,2).**

Throughout the period, service members younger than 25 years old were less likely than those older to receive a migraine diagnosis; however, prevalences of migraine were fairly stable across age groups older than 25 years **(Table 1).**

Among the Services, the proportions of members who received migraine and other headache-related diagnoses were highest in the Air Force, lowest in the Marine Corps, and intermediate in the Army, Navy, and Coast Guard. As in the past,[8] prevalences of migraine were approximately 50-75% higher among enlisted service members than commissioned and warrant officers **(Table 1).**

Overall and in each subgroup, the proportions of service members who received migraine diagnoses generally increased during the period (% change in migraine prevalence overall, 2001-2007: +27.3%). The proportions of service members who received any headache diagnosis also increased during the period (% change in headache prevalence overall, 2001-2007: +8.3%) – but by relatively less than migraine **(Tables 1,2).**

In 2007, there were 13,419 incident (first ever per person) migraine diagnoses among active component members – the incidence rate in 2007 was 11.7 per 1,000 person-years (p-yrs) **(Table 3).** Throughout the period, incidence rates were 4-5-times higher among females than males. However, among males, incidence rates monotonically increased from 2001

Table 2. Number and period prevalence (%) of service members who received a hospital discharge or primary outpatient diagnosis of headache (including migraine), by year, active components, U.S. Armed Forces, 2001-2007

	Headache													
	2001		2002		2003		2004		2005		2006		2007	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sex														
Female	19,170	9.44	19,639	9.45	20,280	9.48	21,429	9.94	20,128	9.59	19,903	9.92	20,041	9.92
Male	29,241	2.46	28,928	2.42	29,264	2.39	30,824	2.50	28,463	2.32	29,591	2.49	32,802	2.73
Age group														
17-24	20,759	3.63	21,264	3.60	21,643	3.57	22,497	3.65	19,874	3.32	19,464	3.46	21,153	3.70
25-34	16,681	3.47	16,114	3.39	16,660	3.42	17,926	3.60	17,380	3.43	18,325	3.63	19,405	3.80
35-44	9,667	3.25	9,789	3.32	9,772	3.31	10,255	3.55	9,721	3.46	10,037	3.66	10,531	3.86
45+	1,304	3.09	1,400	3.21	1,469	3.17	1,575	3.37	1,616	3.38	1,668	3.50	1,754	3.64
Service														
Army	18,816	3.98	18,556	3.91	17,629	3.63	19,077	3.91	17,731	3.62	18,192	3.79	20,802	4.12
Navy	10,213	2.80	10,628	2.85	11,059	2.93	11,300	3.02	10,734	2.95	10,740	3.07	10,666	3.15
Air Force	14,993	4.29	15,115	4.32	16,217	4.48	17,245	4.62	15,592	4.29	15,636	4.54	15,977	4.70
Marine Corps	3,705	2.16	3,501	2.03	3,463	1.99	3,368	1.91	3,400	1.91	3,550	2.02	3,936	2.19
Coast Guard	684	1.96	767	2.17	1,176	3.13	1,263	3.27	1,134	2.90	1,376	3.50	1,462	3.65
Grade														
Enlisted	43,486	3.71	43,730	3.70	44,644	3.70	46,862	3.85	43,366	3.61	44,023	3.80	47,282	4.03
Officer	4,925	2.22	4,837	2.17	4,900	2.13	5,391	2.30	5,225	2.24	5,471	2.37	5,561	2.41
Total	48,411	3.47	48,567	3.46	49,544	3.45	52,253	3.60	48,591	3.39	49,494	3.56	52,843	3.76

Table 3. Incidence (first ever per person) rate (per 1,000 person-years) of migraine diagnosis, by gender, active component, U.S. Armed Services, by year, 2001-2007

Males

Year	Army		Coast Guard		Air Force		Marine Corps		Navy		Total	
	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*
2001	2,551	6.60	149	4.80	1,880	6.97	692	4.36	1,457	4.81	6,729	5.86
2002	2,530	6.64	146	4.53	1,858	6.97	644	4.14	1,613	5.50	6,791	6.02
2003	2,532	7.93	202	6.03	1,896	7.12	701	5.03	1,779	6.25	7,110	6.82
2004	2,926	8.67	214	6.32	2,047	7.43	702	5.02	1,745	5.98	7,634	7.08
2005	2,895	8.92	170	5.03	1,814	7.05	807	5.77	1,714	6.11	7,400	7.14
2006	2,952	9.22	225	6.63	1,906	7.66	824	5.89	1,794	6.71	7,701	7.62
2007	3,374	10.45	229	6.67	1,893	7.95	823	5.78	1,666	6.65	7,985	8.08

Females

Year	Army		Coast Guard		Air Force		Marine Corps		Navy		Total	
	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*	Incident diagnoses	Incidence rate*
2001	2,031	30.24	52	15.12	1,784	30.04	192	19.40	1,181	24.96	5,240	27.99
2002	2,048	30.92	57	15.83	1,837	30.53	182	19.13	1,239	26.21	5,363	28.71
2003	2,035	34.80	119	31.05	2,066	34.00	205	22.16	1,363	29.48	5,788	32.41
2004	2,353	40.32	94	23.19	2,093	33.83	223	23.73	1,477	31.77	6,240	34.63
2005	2,122	39.59	119	28.49	1,837	32.20	289	30.83	1,418	32.38	5,785	34.44
2006	2,114	40.59	113	26.37	1,801	32.53	237	25.51	1,401	33.58	5,666	34.82
2007	2,102	40.54	142	32.04	1,630	31.02	244	25.15	1,316	33.14	5,434	34.34

*Incidence rate per 1,000 person-years

(5.9 per 1,000 p-yrs) to 2007 (8.1 per 1,000 p-yrs), while among females, incidence rates sharply increased from 2001 (28.0 per 1,000 p-yrs) to 2004 (34.6 per 1,000 p-yrs) and then were stable **(Table 3).** By the end of the surveillance period, incidence rates of migraine (in contrast to proportions of service members affected by migraine) were higher in the Army than the Air Force, reflecting a sharp and sustained increase in incidence rates in the Army from 2002 through 2007 **(Figure 1).**

In 2007, there were 106,837 ambulatory visits for headaches of all types – approximately 40% were reported as migraines **(Figure 2).** During the year, there were 35 and 54 ambulatory visits per 1,000 p-yrs for migraines and non-migraine headaches, respectively **(Figure 2).** Total headache-related visits, and rates of visits for migraine and "other" headaches, were higher in 2007 than any other year of the period **(Figure 2).** In 2007, rates of migraine-specific ambulatory visits were more than twice as high in the Air Force (42 per 1,000 p-yrs) and Army (40 per 1,000 p-yrs) than the Marine Corps (16 per 1,000 p-yrs) (data not shown).

Overall, migraines accounted for 0.77% of all illness and injury-related lost duty days. Among the services, migraines had the relatively largest and smallest impacts in the Air Force (1.18% of all lost duty days) and Marine Corps (0.39% of all lost duty days), respectively. Of note, in the Navy, the relative impact of migraine doubled from the beginning to the end of the period (% of total lost duty days due to migraine: 0.61% [2001]; 1.22% [2007]) **(Figure 3).**

Figure 1. Incidence rate of migraine diagnosis (per 1,000 person-years), active component members, by Service and year, 2001-2007

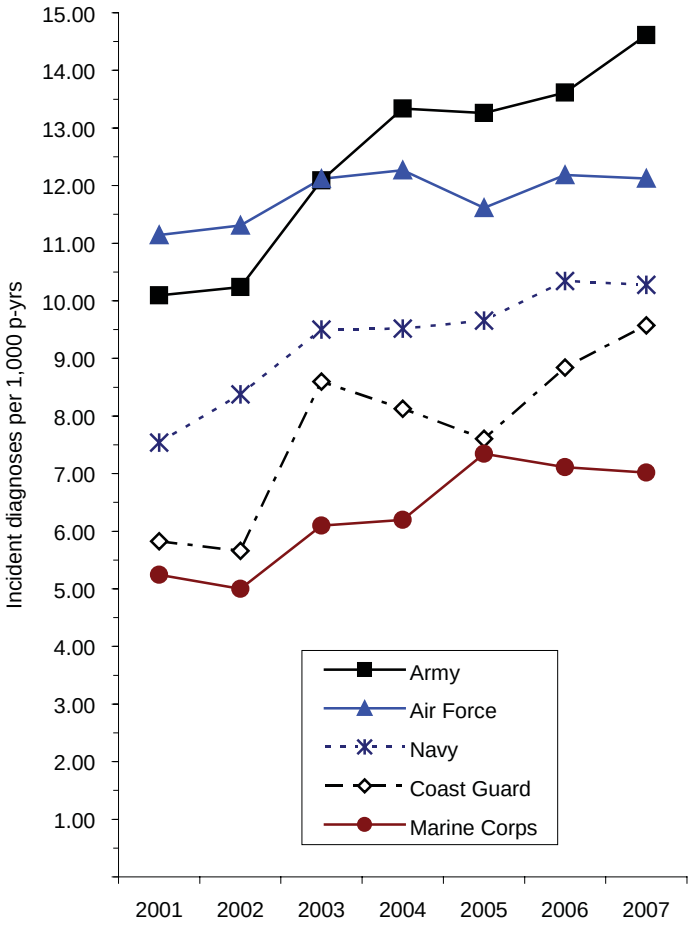


Figure 2. Total ambulatory visits for headaches (all causes) and rates of ambulatory visits for migraine and non-migraine headaches, active components, U.S. Armed Services, by year, 2001-2007

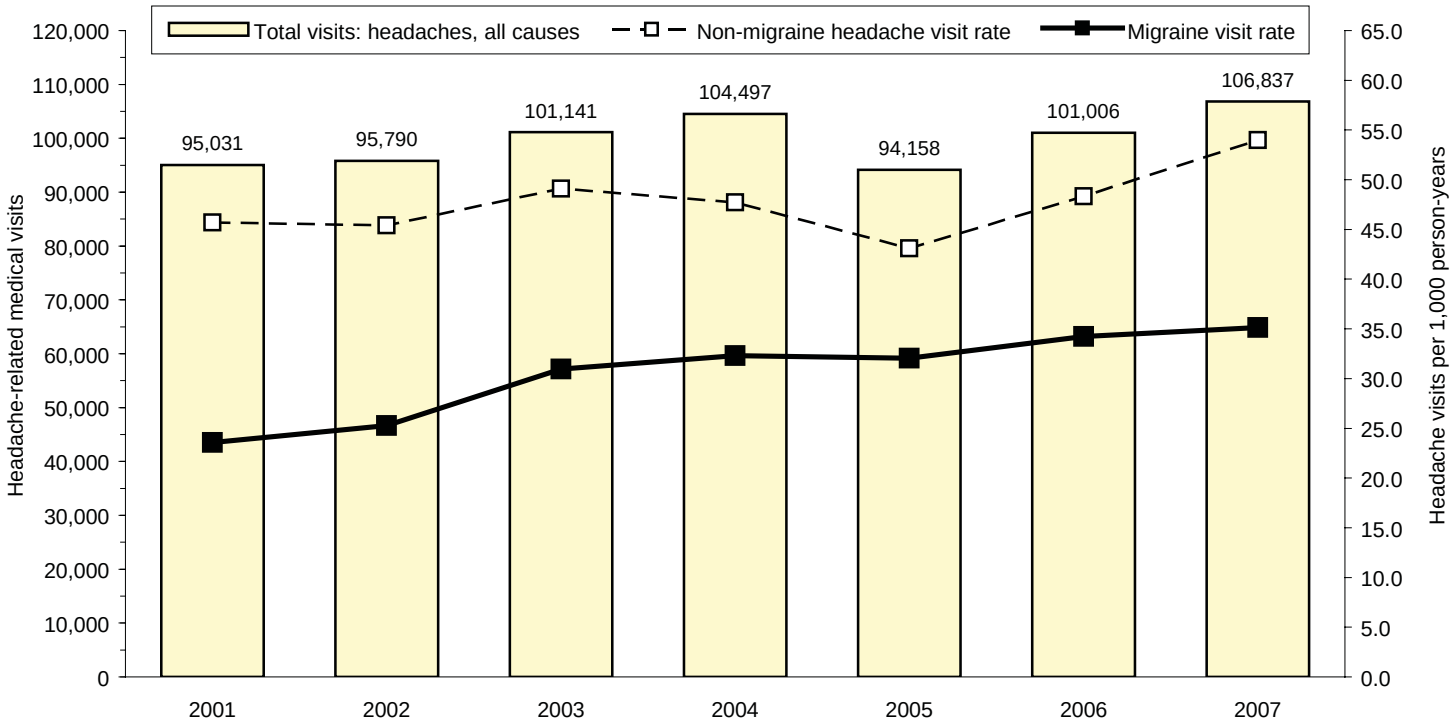
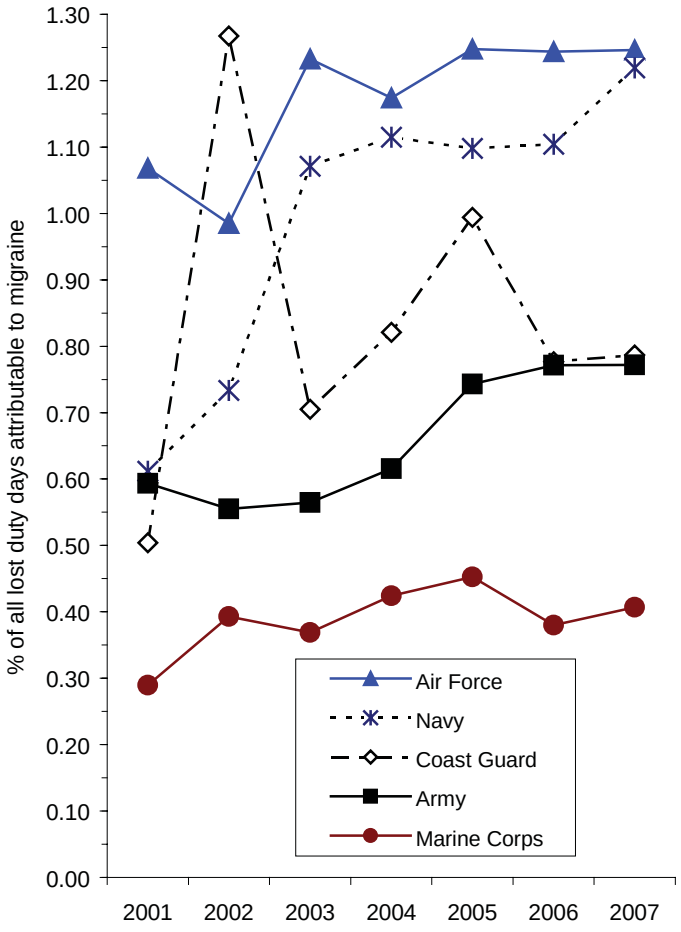


Figure 3. Percent of all illness and injury-related lost duty days attributable to migraine, active component members, by Service and year, 2001-2007



Editorial comment:

Migraine, and headaches in general, are important health concerns for the military services because they often have sudden, unpredictable onsets; are relatively common among young adults; are potentially debilitating; and are operationally and medically costly. Applicants to military service are medically disqualified if they have histories of severe and frequent headaches. Recruit medical screening has been shown to be sufficiently strict to exclude those who may be inordinately compromised by headache.[9] However, severe headaches, including migraine, may manifest for the first time during military service.

Prevalences and incidence rates of headache in general and migraine in particular are likely underestimated by reviewing records of medical encounters. Most migraine/headache sufferers do not seek medical diagnoses, and most use over-the-counter analgesics for treatment.[10] Among U.S. military members, case ascertainment may be relatively complete because medical care is readily available and medical conditions that result in limited duty or convalescence in quarters must be medically evaluated. Still, interviews/surveys of active component members would likely find higher prevalences of migraine and other headaches than those estimated in this report.[10]

In this analysis, members of the Air Force had the highest documented prevalences of migraine and other headaches. The finding is consistent with prior surveillance results.[8] However, since 2003, the Army has had the highest

incidence of new-onset migraine cases, reflecting a trend of sharply increasing incidence since 2002 (**Figure 1**). Among male soldiers, incidence rates of migraine increased nearly 60% from 2002 to 2007, a period of continuous U.S. Army combat operations in Afghanistan and Iraq.

Several studies have reported or hypothesized relationships between post-traumatic stress disorder (PTSD), depression, traumatic brain injury (TBI) and headache, including migraine.[11-13] For example, in a study of U.S. Army infantry soldiers who had recently returned from deployments in Iraq, Hoge and colleagues found strong associations between mild TBI, PTSD, depression, and physical health symptoms, including headache. In this cohort, after controlling for the effects of PTSD and depression, headache was the only physical symptom that was statistically significantly associated with mild TBI.[11] The authors recommended a multidisciplinary approach to the evaluation and treatment at the primary care level of the physical and psychological symptoms of combat veterans.[11] Based on their findings in non-military populations, deLeeuw and colleagues recommended screening for PTSD during routine clinical evaluations of headache.[12] Perhaps, deployment veterans who present with their first ever migraines should be screened for psychological comorbidities (e.g., PTSD, depression) as well as TBI.

Migraine is an especially severe form of headache – many migraine sufferers are totally incapacitated during attacks. Migraine-specific treatments can decrease the pain and disability of in-progress attacks. In addition, daily migraine prevention regimens have been shown to reduce health care utilization and associated costs in beneficiaries of the U.S. Military Health System.[14] Yet, it is likely that relatively few military members affected by migraines have been diagnosed and prescribed medications specific for acute migraine treatment; and even fewer military members affected by migraine have been evaluated for daily preventive treatment – which may provide significant clinical, health care utilization, and operational benefits.

In summary, the causes, military operational impacts, and effects of preventive interventions (e.g., daily preventive treatment) of headache, including migraine, should be focuses of clinical and military prevention research activities, especially during and after returning from combat operations.

Report and data analysis by Christopher B. Martin, MHS.

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Prescriptions for Psychotropic Medications within One Year before Deployment: The Experience of a U.S. Army Combat Unit, 2007

Recent studies have documented the natures and prevalences of mental disorders – particularly, depression and post-traumatic stress disorder (PTSD) – among participants in military operations in Iraq and Afghanistan.[1-9] For example, among soldiers and Marines who recently returned from combat deployments, Hoge and colleagues documented prevalences of broadly defined depression, anxiety, and post-traumatic stress disorder (PTSD) of 15%, 17.5%, and 18.0%, respectively.[1] The findings are generally consistent with those among combat veterans of earlier wars.[10]

A recent study of U.S. recruits found that 11% had psychiatric histories prior to entering the military.[11] Psychotropic medications are often and increasingly used to treat mental health conditions in both civilian[12,13] and military populations.[14,15] In addition, recent changes in the accession standards of the U.S. military eliminated the prohibition against mild attention-deficit/hyperactivity disorder (ADHD)[12] and increased enlistments of applicants with relatively low educational attainment. In the general population, ADHD and low educational attainment are associated with relatively high prevalences of mental health conditions.[13] Thus, because of greater use of psychotropic medications by young adult Americans, recent changes in accession standards, and reduced stigmas associated with and greater access to mental health care in the military, psychotropic medication use by deploying service members may be more frequent now than previously. Yet, the natures, prevalences, and effects of psychotropic medication use among service members who participate in combat operations have not been examined.

During 2007, members of a battalion-sized unit of the U.S. Army deployed overseas to conduct combat operations as part of an international coalition. While assessing the prevalence of pharmacologic contraindications to the use of mefloquine for malaria prophylaxis[18-21], it was noted that a high proportion of the deploying soldiers had been prescribed anxiolytic and antidepressant medications. For this report, prescriptions for psychotropic medications that were dispensed to members of the unit within the year before deployment were reviewed. The findings are discussed in relation to pre-deployment medical screening and accession medical standards policies.

Methods:

The surveillance cohort included soldiers who were assigned to and deployed with a U.S. Army combat unit in 2007. Cohort members were identified through the Defense Theater Accountability System (DTAS). Medications that were prescribed to cohort members within 12 months before deployment were ascertained from records in the Pharmacy Data Transaction Service (PDTS) database that is maintained by the DoD Pharmacoeconomics Center.[22] PDTS records document prescription drugs that are dispensed at military treatment facilities and retail pharmacy sites (if paid for by the Military Healthcare System [MHS]). Medications dispensed during overseas deployments are not typically documented in the PDTS database and thus were not included in analyses.

Records routinely maintained in the Defense Medical Surveillance System (DMSS)[23] were used to document prior deployments and medical encounters for mental disorders within the 12 months prior to deployment of all cohort members. Medical encounters for mental disorders were ascertained from records of hospitalizations and ambulatory

Table 1. Generic and trade names of psychotropic medications included in analysis, by therapeutic class

Selective serotonin reuptake inhibitors (SSRIs)	
Citalopram	(Celexa®)
Escitalopram	(Lexapro®)
Fluoxetine	(Prozac®)
Sertraline	(Zoloft®)
Paroxetine	(Paxil®, Pexeva®)
Anxiolytics	
Diazepam	(Valium®)
Lorazepam	(Ativan®)
Alpralozam	(Xanax®)
Serotonin-norepinephrine reuptake inhibitors (SNRIs)	
Duloxetine	(Cymbalta®)
Serotonin-2 antagonist/reuptake-inhibitors (SARIs)	
Trazodone	(Desyrel®)
Tricyclic antidepressants (TCAs)	
Amitriptyline	(Elavil®)
Nortriptyline	(Pamelor®)
Anticonvulsants	
Clonazepam	(Klonopin®)
Gabapentin	(Neurontin®)
Divalproex	(Depakote®)
Lamotrigine	(Lamictal®)
Levitiracetam	(Keppra®)
Attention-deficit/hyperactivity disorder (ADHD)	
Atomoxetine	(Strattera®)
Methylphenidate	(Ritalin®, Concerta®)
Modafinil	(Provigil®)
Mixed amphetamines	(Adderall®)
Atypical antipsychotics	
Quetiapine	(Seroquel®)
Resperidone	(Risperdal®)
Sedative-hypnotics	
Temazepam	(Restoril®)
Triazolam	(Halcion®)

visits at military and nonmilitary (contracted/reimbursed care) treatment facilities that included a diagnosis code indicative of a "mental disorder" (ICD-9-CM codes: 290–319).

Analyses of prescriptions for psychotropic medications in the 12 months prior to deployment were limited to specific therapeutic classes and drugs **(Table 1)**. Specific hypnotic medications, including zolpidem tartrate (Ambien®), zaleplon (Sonata®), and eszopiclone (Lunesta®) were excluded because they are commonly used as sleep-aids during air movement. Specific antidepressants most commonly used for smoking cessation, such as buproprion (Wellbutrin®) were also excluded. To assess attrition of cohort members during the first few months of the deployment, the DTAS roster was queried approximately two months after the deployment date.

Results:

Of the 701 members of the surveillance cohort; 426 (61%) were junior enlisted soldiers, 223 (32%) were non-commissioned officers and 52 (7%) were warrant and commissioned officers. All were males. More than one-half (n=385, 55%) of the cohort members had previously deployed in support of Operation Iraqi Freedom (OIF) and/or Operation Enduring Freedom (OEF).

Approximately one of nine (n=77, 11.0%) cohort members had at least one prescription (dispensed) for a psychotropic medication within 12 months of deploying **(Table 2)**. Prevalences of dispensed psychotropic medications did not significantly vary in relation to the ages, ranks, or military occupational specialties of cohort members **(Table 2)**.

More than one of seven (n=105, 15%) cohort members had prior mental disorder diagnoses. Cohort members with prior mental disorder diagnoses were much more likely than others to have been prescribed psychotropic medications within the year before deployment (X^2=63.09, p<0.001) **(Table 2)**. The proportions of cohort members with recent psychotropic medication prescriptions did not significantly vary in relation to prior deployment experience (X^2 =0.0297, p=0.863) **(Table 2)**.

Within one year before deployment, approximately one of 14 (n=49, 7.0%) cohort members were dispensed anxiolytic drugs **(Table 3)**. Seventeen (2.4%), 16 (2.3%), and 8 (1.1%) members received prescriptions for selective serotonin re-uptake inhibitors (SSRI), attention-deficit/hyperactivity disorder (ADHD) treatments, and/or anticonvulsants, respectively. The remaining drug categories were each dispensed to fewer than 1% of the total deployed cohort **(Table 3)**.

Finally, attrition from the unit during the first two months of the deployment did not significantly vary in relation to psychotropic medication experience before deploying (data not shown).

Editorial comment:

This report documents that approximately one of nine soldiers of a U.S. Army combat unit were prescribed and dispensed psychotropic medications within the year prior to deployment. The prevalence is comparable to that among similarly aged members of the U.S. general population.[15]

Table 2. Demographic, military, and medical characteristics of deployed cohort members, overall and in relation to recently prescribed and dispensed psychotropic medications

	Individuals		Psychotropic prescriptions	
	No.	%	No.	%
Total	701	100.0	77	100.0
Age group				
18-19	39	5.6	2	2.6
20-24	386	55.1	43	55.8
25-29	165	23.5	17	22.1
30-34	63	9.0	9	11.7
35+	39	5.6	6	7.8
Unknown	9	1.3	0	0.0
Grade				
Enlisted	426	60.8	48	62.3
NCO	223	31.8	24	31.2
Officer	52	7.4	5	6.5
Specialty				
Infantry	453	64.6	54	70.1
Other	248	35.4	23	29.9
Prior deployment to OIF/OEF				
No	316	45.1	34	44.2
Yes	385	54.9	43	55.8
*Prior mental health diagnosis**				
No	596	85.0	42	54.5
Yes	105	15.0	35	45.5

*Inpatient or outpatient diagnosis (ICD-9-CM: 290–319) within 12 months prior to deployment

Table 3. Prescriptions for psychotropic medications, by therapeutic class

Therapeutic Class	Individuals	Prescriptions dispensed	Prescriptions per individual (mean)
All classes	77	160	2.1
Anxiolytics	49	55	1.1
SSRIs	17	30	1.8
ADHD treatments	16	37	2.3
Anticonvulsants	8	22	2.8
SARIs	5	7	1.4
TCAs	5	6	1.2
Atypical antipsychotics	2	2	1.0
Sedative-hypnotics	1	1	1.0
SNRIs	0	0	0.0

SSRI: Selective serotonin reuptake inhibitors
SARI: Serotonin-2 antagonist/reuptake-inhibitors
TCA: Tricyclic antidepressants
SNRI: Serotonin-norepinephrine reuptake inhibitors

Of interest, there was not a significant difference in rates of attrition during the first two months of deployment among service members with and without histories of recent psychotropic medication use.

Since October 2006, federal law has required the Secretary of Defense to specify "the mental health conditions…and receipt of psychotropic medications for such conditions that preclude deployment" to a combat or contingency operation.[24] Relevant to this requirement, current DoD guidelines state that the broad use of psychotropic medications to treat a variety of mental health conditions is compatible with deployment; only psychotic and bipolar disorders are considered disqualifying for deployment; certain classes of psychotropic medications, including short half-life benzodiazepines and stimulants are "clinically and operationally problematic" during deployments; and medication prescribed within 3 months prior to deployment that has yet to demonstrate efficacy or be free of significantly impairing side effects are disqualifying for deployment. [25]

In the cohort of interest for this report, 7.0% of soldiers had been prescribed anxiolytics, and 2.3% had been prescribed ADHD treatments (in the same therapeutic class as amphetamine stimulants), in the year prior to deployment. Also, two cohort members had been dispensed atypical antipsychotics within three months of deployment. Of note, prescriptions for atypical antipsychotic drugs do not imply the clinical indications for their use; for example, atypical antipsychotics are increasingly used to treat conditions other than psychosis, including PTSD.[26,27] Thus, in the cases cited here, the clinical indications for and responses to treatment were unknown; hence, compliance with DoD guidelines regarding deployment eligibility could not be assessed.

During combat operations, there are numerous and diverse psychological stressors that may be clinically significant; yet, in such situations, there are limited capabilities to monitor the clinical courses and responses to treatment of preexisting mental disorders. Because service members may be reluctant to reveal mental health concerns during clinical and structured screening examinations, the reliability and usefulness of population-based pre-deployment health assessments are questionable.[8] The potential of mass screenings to stigmatize the problems that screening seeks to identify also has been noted.[28] The findings of this report reinforce the concerns of others regarding the ability of pre-deployment health assessments to identify mental disorders that are diagnosed prior to deployment that may be medically and military operationally significant during deployment.

This analysis has several limitations that should be considered when interpreting the findings. For example, the subject cohort may not be representative of the U.S. military in general; hence, the findings may not be generalizable to other U.S. military units, subgroups of service members, times, or settings. Also, this analysis was restricted to psychotropic medications that were prescribed and dispensed prior to deployment. However, no data were available regarding medications prescribed or dispensed during deployment (e.g., by medics and healthcare providers at deployed clinics and hospitals). Thus, uses of psychotropic medications before deployment, and the frequencies and types of medications prescribed to and/or used by cohort members while deployed, are unknown. In addition, for this analysis, prior mental disorders were ascertained from administrative records of hospitalizations and ambulatory visits that included a diagnostic code broadly indicative of a "mental disorder" (based on categories of diagnostic codes in the ICD-9-CM). However, the "mental disorders" category of the ICD-9-CM includes some diagnoses that are not necessarily indicative of a clinically significant mental disorder, e.g., tobacco use disorder (ICD-9-CM 305.1), tension headache (ICD-9-CM 307.81).

Despite the limitations, however, the findings are interesting, informative, and relevant to force health protection policies and practices. For example, Hill and colleagues recently reported that, during an 11-month period in 2004, nearly one-third (29.9%) of service members evaluated by a mental health team in Iraq had considered suicide "within the past week"; and of these, nearly two-thirds (63.8%) had specific plans.[29] While the relationship between deployment and suicide risk is unclear, deployers with certain mental disorders and/or taking certain psychotropic medications may be more susceptible to disabling anxiety, depression, fear, guilt, shame, etc. – which may increase suicide risk – after psychologically traumatic experiences or sustained periods of high stress.

Also, for example, in counterinsurgency and combat operations, small errors in judgment and aberrant behavior can have large consequences. The effects of mental disorders on emotional and executive functioning may include increased aggression, impulsivity, and decreased moral reasoning (with ADHD); decreased problem solving ability, working memory, and sustained attention (with depression and PTSD); and impaired episodic memory (with PTSD).[30-33] Clearly, the medical and military operational consequences of deploying service members with prior mental disorders into combat environments should be assessed.

This report's findings may also be relevant to accession medical standards and recruitment efforts. For example, once in military service, individuals with pre-existing mental disorders are as likely as others to participate in combat operations. Perhaps, civilian applicants for military service with histories of mental disorders should be counseled regarding the mental health risks (e.g., depression, anxiety, PTSD) associated with participation – possibly including direct participation in combat – in inherently stressful and prolonged deployment operations.

Finally, this analysis suggests a role for pharmaco-surveillance in deployment health surveillance. For example, automated decision-support tools would enable health care

providers to review the medical and pharmaceutical histories of service members during pre-deployment health risk assessments.

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Incident Diagnoses of Sarcoidosis, Active Components, U.S. Armed Forces, 1999-2007

Sarcoidosis is an immunologic disorder that produces granulomas in tissues throughout the bodies of affected hosts. The anatomic sites most frequently affected at the time of clinical presentation are the lung and lymph nodes. The causes of the widespread granulomatous responses that are the hallmark of sarcoidosis are unknown. Infectious, environmental, and occupational exposures have been hypothesized as precipitating agents. Numerous reports and genetic studies of familial clusters of sarcoidosis suggest a genetic component to susceptibility.[1,2]

The disease has a highly variable clinical course ranging from a brief, self-limited illness that is clinically insignificant to a continuously progressing, widely disseminated, chronically debilitating illness that can be fatal. The clinical manifestations are non-specific and include fatigue, malaise, low grade fever, weight loss, shortness of breath, dry cough, muscle and joint pains, blurred vision, hepato-splenomegaly, skin nodules, and rashes.

In the United States, young adults in their twenties have the highest rates of clinical onset of sarcoidosis. The disease has a worldwide distribution. In civilian and military populations in the United States, higher incidence rates and more virulent clinical courses have been documented among African Americans.[3-6]

Sarcoidosis is militarily relevant because it affects otherwise healthy, young adults; its causes are unknown; military-specific exposures (e.g., service on aircraft carriers) have been hypothesized as precipitating factors; and military members serve in locations worldwide where they may be exposed to novel environmental, infectious, and industrial agents.[3-6]

This report summarizes incidence rates and trends of hospitalizations and ambulatory medical encounters for sarcoidosis among active component members of the U.S. Armed Forces from January 1999 through December 2007.

Methods:

The surveillance period was 1 January 1999 to 31 December 2007. The surveillance population included all individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period.

Figure 1. Annual numbers of incident diagnoses of sarcoidosis by clinical setting, and proportions of incident cases diagnosed during hospitalization, active components, U.S. Armed Forces, 1999-2007

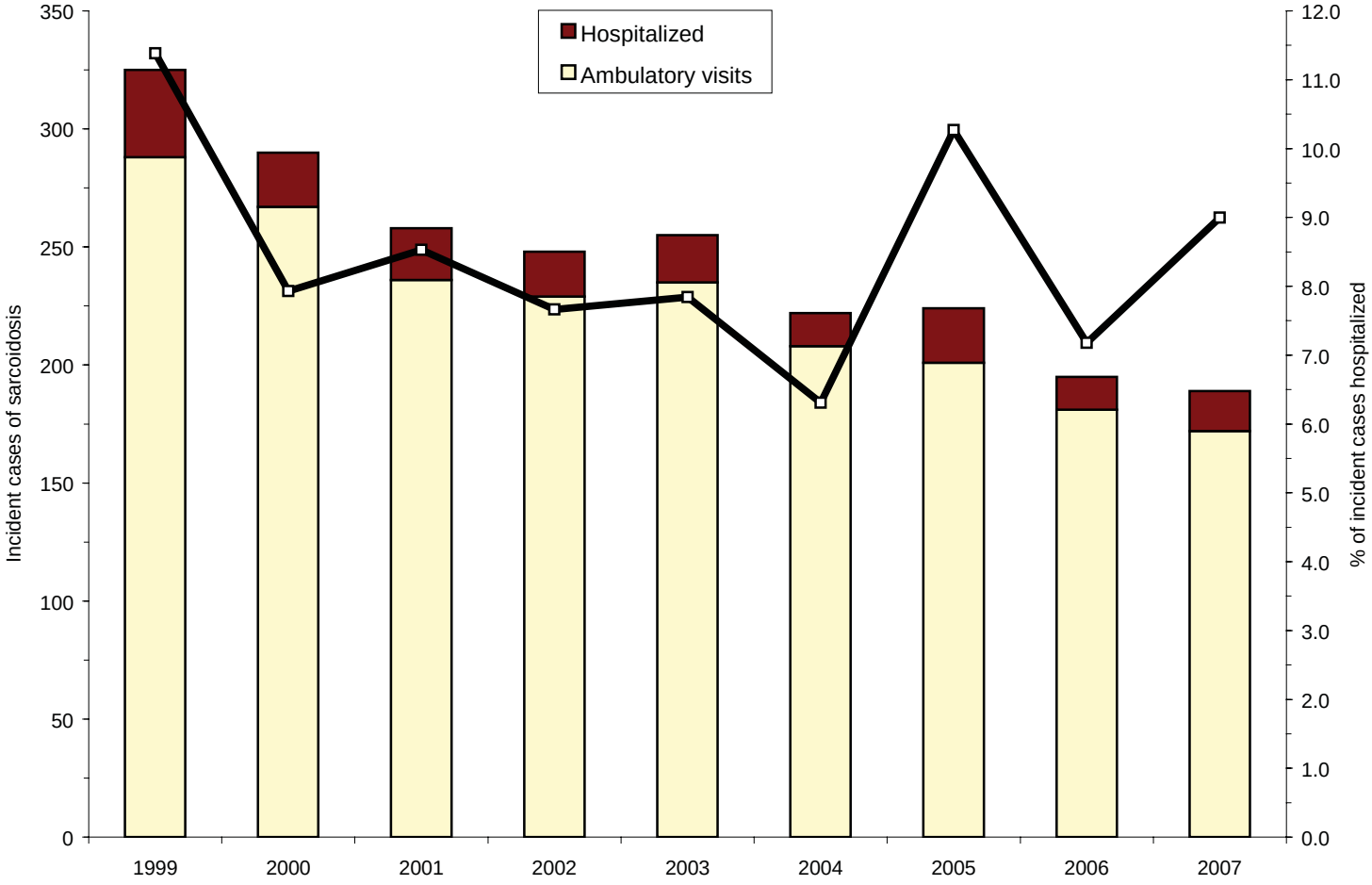


Table 1. Numbers and rates* of incident diagnoses of sarcoidosis, active components, U.S. Armed Forces, January 1999-December 2007

	1999		2000		2001		2002		2003		2004		2005		2006		2007	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Total	325	2.39	290	2.13	258	1.89	248	1.79	255	1.81	222	1.57	224	1.63	195	1.43	189	1.39
Service																		
Army	170	3.63	141	2.98	124	2.62	130	2.71	118	2.41	110	2.23	105	2.16	95	1.93	99	1.94
Navy	59	1.62	58	1.59	58	1.58	53	1.41	58	1.54	50	1.35	45	1.26	43	1.24	40	1.20
Air Force	83	2.33	76	2.16	63	1.81	50	1.39	65	1.77	54	1.44	59	1.67	48	1.39	38	1.14
Marine Corps	13	0.76	15	0.87	13	0.76	15	0.87	14	0.79	8	0.45	15	0.84	9	0.51	12	0.66
Sex																		
Male	247	2.12	218	1.87	204	1.76	196	1.66	211	1.76	173	1.44	175	1.49	156	1.34	155	1.33
Female	78	4.05	72	3.65	54	2.68	52	2.50	44	2.08	49	2.33	49	2.44	39	1.97	34	1.74
Race/ethnicity																		
White, non-Hispanic	81	0.96	100	1.17	106	1.24	93	1.07	108	1.22	85	0.96	87	1.01	74	0.86	76	0.88
Black, non-Hispanic	209	7.76	163	6.00	132	4.84	137	5.04	130	4.85	119	4.60	119	4.88	101	4.32	95	4.16
Other	35	1.40	27	1.15	20	0.85	18	0.73	17	0.65	18	0.67	18	0.67	20	0.74	18	0.67
Age																		
<20	1	0.09	4	0.32	4	0.32	7	0.58	3	0.27	3	0.27	0	0.00	1	0.11	2	0.20
20-24	20	0.48	26	0.61	24	0.54	30	0.65	41	0.84	28	0.57	31	0.66	25	0.54	17	0.37
25-29	44	1.57	43	1.58	39	1.49	32	1.19	33	1.18	41	1.41	36	1.22	33	1.10	33	1.09
30-34	80	3.72	60	2.89	47	2.33	40	1.98	43	2.13	46	2.28	36	1.82	32	1.66	43	2.24
35-39	103	5.07	78	3.92	79	4.09	67	3.54	57	3.12	45	2.56	44	2.60	44	2.64	35	2.11
40+	77	5.84	79	5.98	65	4.75	72	5.01	78	5.33	59	3.99	77	5.27	60	4.23	59	4.29
Military occupation																		
Combat	51	1.86	40	1.46	39	1.43	37	1.35	37	1.33	34	1.20	32	1.11	37	1.23	40	1.40
Health care	41	3.52	43	3.76	28	2.43	24	2.07	22	1.88	25	2.13	30	2.65	24	2.15	16	1.45
Other	233	2.41	207	2.13	191	1.96	187	1.87	196	1.93	163	1.61	162	1.66	134	1.41	133	1.38

*Rate per 10,000 person-years

For this analysis, an incident case of sarcoidosis was defined as a hospitalization with a discharge diagnosis (in any diagnostic position) of "sarcoidosis" (ICD-9-CM: 135); or two or more ambulatory visits within 30 days with discharge diagnoses (in any diagnostic position) of "sarcoidosis". Each individual was included as an incident case only once during the surveillance period.

Results:

From 1999 to 2007, there were 2,206 incident cases of sarcoidosis among active component members **(Table 1)**. The overall incidence rate during the period was 1.78 per 10,000 person-years (p-yrs). During the period, annual numbers and rates of incident diagnoses significantly declined (change in rates, 1999-2007: -41.9%) **(Table 1, Figure 1).**

Overall, 8.6% of all incident cases were diagnosed during hospitalizations. Relatively more incident cases were hospitalized (11.4%) in 1999 than any other year of the period. From 2000 to 2007, the proportions hospitalized were relatively low and remained fairly stable (range, % of incident cases hospitalized per year, 2000-2007: 6.3-10.3%) **(Figure 1).**

Among the services, the highest incidence rate of sarcoidosis diagnoses was in the Army **(Table 1)**. Overall, rates were higher among females than males and monotonically increased with age – the rate was nearly 20 times higher among those older than 40 than those younger than 20. Rates were higher by far among black non-Hispanic than other racial-ethnic subgroup members; of note, among black non-Hispanic service members, rates sharply declined from 1999 to 2001 and then were fairly stable **(Table 1, Figure 2).**

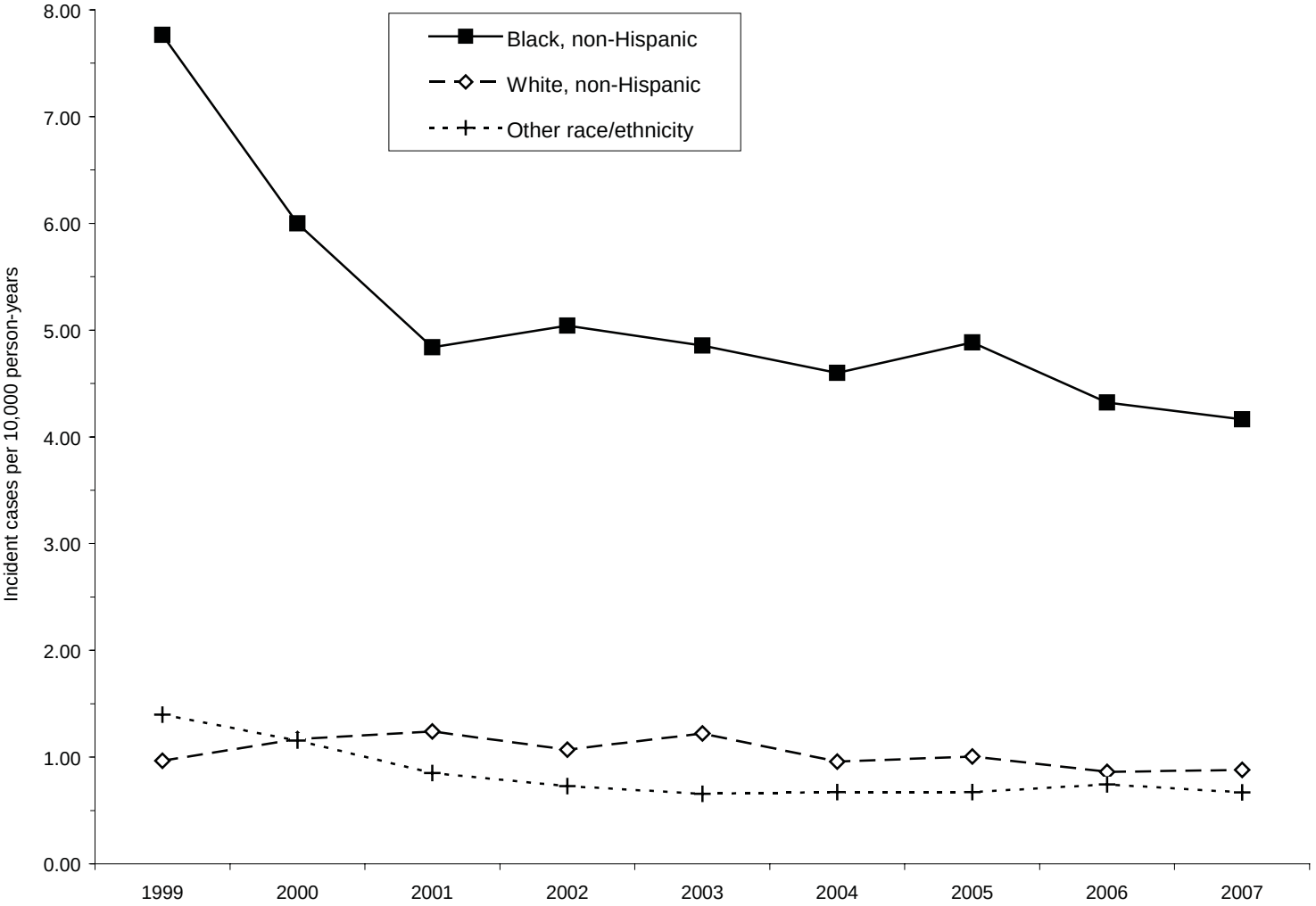
"Lung involvement in condition classified elsewhere" – i.e., sarcoidosis of the lungs – was the only condition reported as a secondary diagnosis (18.4%) in at least 2% of all hospitalized cases. "Lung involvement in condition classified elsewhere" (5.8%) and "essential hypertension, unspecified" (2.2%) were the only conditions reported as secondary diagnoses in at least 2% of all outpatient diagnosed cases (data not shown).

Editorial comment:

This report documents sharply declining numbers and rates of incident diagnoses of sarcoidosis among active U.S. military members since 1999. It is difficult to attribute all or any portion of the decline to specific changes in environmental exposures, military activities, personal behaviors, or protective measures because the causes of sarcoidosis are unknown.

Not surprisingly, incidence rates of sarcoidosis were higher among black non-Hispanic and female service members than their respective counterparts. Somewhat unexpectedly, rates of incident diagnoses sharply increased with age and were

Figure 2. Annual rates of incident diagnoses of sarcoidosis by race-ethnicity, active components, U.S. Armed Forces, 1999-2007



highest by far among those older than 40. The declining rates overall during the period were mostly attributable to very sharp declines in rates among black non-Hispanic and relatively older (age >30 years) service members.

There are limitations of this summary that should be considered when interpreting the results. For example, for this analysis, cases were ascertained from standardized administrative records of hospitalizations and ambulatory visits in "fixed" medical treatment facilities. Such records do not provide details regarding clinical histories, physical findings, or results of diagnostic tests (e.g., biopsies). Hence, the completeness and accuracy of case ascertainment are unknown. Also, declining rates of incident diagnoses may reflect changes over time in the ability to make specific diagnoses of "sarcoidosis-like" illnesses and/or criteria for diagnosis of sarcoidosis – rather than actual changes in disease incidence. In this regard, during the period, there were not significant changes in the proportions of cases that were diagnosed during hospitalization; included bronchoscopies and/or lung biopsies as diagnostic procedures (data not shown); or had secondary diagnoses inconsistent with primary diagnoses of sarcoidosis.

In summary, while these surveillance findings have limitations, they suggest that sarcoidosis case incidence has not increased – and likely has continued to decrease – among U.S. service members since 1999.

References:

1. Rybicki BA, Maliarik MJ, Major M, Popovich J Jr, Iannuzzi MC. Epidemiology, demographics, and genetics of sarcoidosis. *Semin Respir Infect*. 1998 Sep;13(3):166-73.

2. Rybicki BA, Iannuzzi MC. Epidemiology of sarcoidosis: recent advances and future prospects. *Semin Respir Crit Care Med*. 2007 Feb;28(1):22-35.

3. McDonough C, Gray GC. Risk factors for sarcoidosis hospitalization among U.S. Navy and Marine Corps personnel, 1981 to 1995. *Mil Med.* 2000 Aug;165(8):630-2.

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Update: Deployment Health Assessments, U.S. Armed Forces, April 2008

The health protection strategy of the U.S. Armed Forces is designed to deploy healthy, fit, and medically ready forces, to minimize illnesses and injuries during deployments, and to evaluate and treat physical and psychological problems (and deployment-related health concerns) following deployment.

In 1998, the Department of Defense initiated health assessments of all deployers prior to and after serving in major operations outside of the United States.[1] In March 2005, the Post-Deployment Health Reassessment (PDHRA) program was begun to identify and respond to health concerns that persisted for or emerged within three to six months after return from deployment.[2]

This report summarizes responses to selected questions on deployment health assessments completed since 2003. In addition, it documents the natures and frequencies of changes in responses from before to after deployments.

Methods:

Completed deployment health assessment forms are transmitted to the Armed Forces Health Surveillance Center (AFHSC) where they are incorporated into the Defense Medical Surveillance System (DMSS).[3] In the DMSS, data recorded on health assessment forms are integrated with data that document demographic and military characteristics and medical encounters (e.g., hospitalizations, ambulatory visits) at fixed military and other (contracted care) medical facilities of the Military Health System. For this analysis, DMSS was searched to identify all pre (DD2795) and post (DD2796) deployment health assessment forms completed since 1 January 2003 and all post-deployment health reassessment (DD2900) forms completed since 1 August 2005.

Results:

Since January 2003, 1,894,165 pre-deployment health assessment forms, 1,905,125 post-deployment health assessment forms, and 486,998 post-deployment health reassessment forms were completed at field sites, transmitted to the AFHSC, and integrated into the DMSS **(Figure 1)**. Throughout the period, there were intervals of approximately 2-4 months between peaks of pre-deployment and post-deployment health assessments (that were completed by different cohorts of deployers) **(Figure 1)**. Post-deployment health reassessments rapidly increased between February and May 2006 **(Figure 1)**. Since then, numbers of reassessment forms per month have been relatively stable (reassessment forms per month, May 2007-April 2008: mean: 22,602; range: 16,741-33,361) **(Figure 1, Table 1)**.

Between May 2007 and April 2008, nearly three-fourths (73.4%) of deployers rated their "health in general" as "excellent" or "very good" during pre-deployment health assessments **(Figure 2)**. During the same period, only 59.0% and 52.5% of redeployers rated their general health as "excellent" or "very good" during post-deployment assessments and post-deployment reassessments, respectively **(Figure 2)**.

From pre-deployment to post-deployment to post-deployment reassessments, there were sharp increases in the proportions of deployers who rated their health as "fair" or "poor"

Figure 1. Total deployment health assessment and reassessment forms, by month, U.S. Armed Forces, January 2003-April 2008

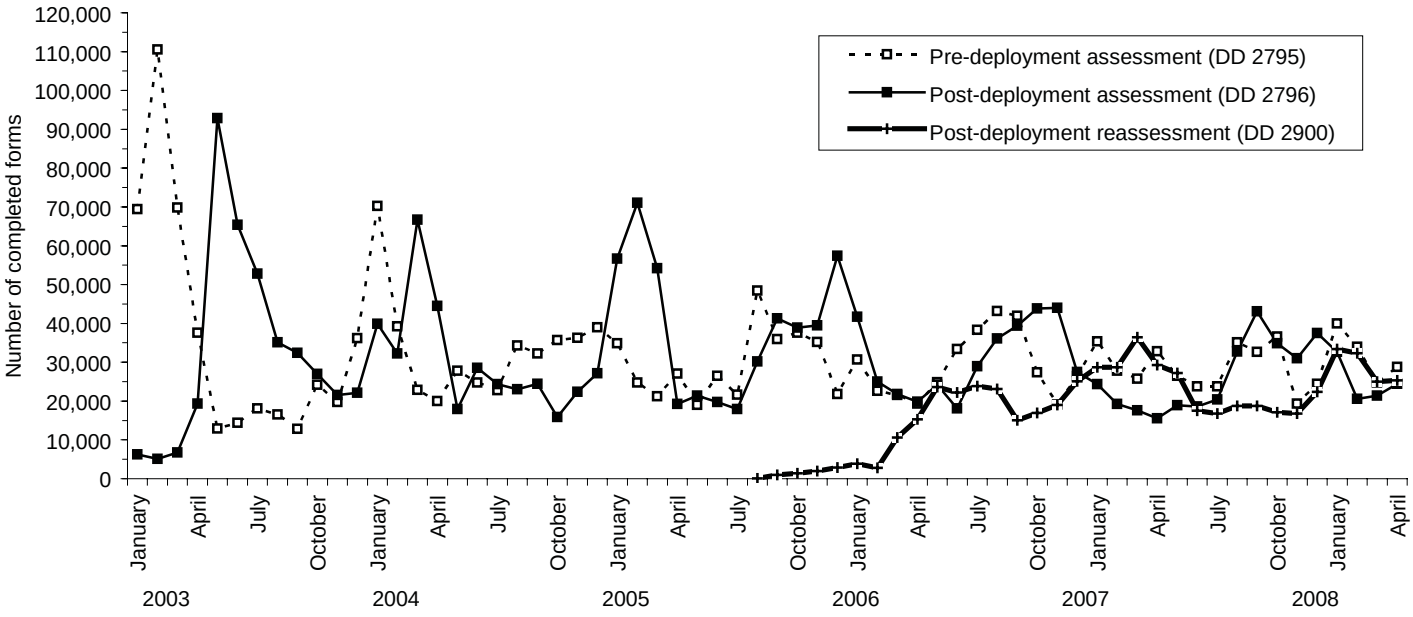


Table 1. Deployment-related health assessment forms, by month, U.S. Armed Forces, May 2007-April 2008

	Pre-deployment assessment DD2795		Post-deployment assessment DD2796		Post-deployment reassessment DD2900	
	No.	%	No.	%	No.	%
Total	**349,769**	**100**	**336,207**	**100**	**271,225**	**100**
2007						
May	26,483	7.6	18,905	5.6	27,209	10.0
June	23,775	6.8	18,603	5.5	17,499	6.5
July	23,806	6.8	20,401	6.1	16,741	6.2
August	35,116	10.0	32,727	9.7	18,731	6.9
September	32,660	9.3	43,091	12.8	18,733	6.9
October	36,591	10.5	34,863	10.4	17,101	6.3
November	19,349	5.5	31,001	9.2	16,815	6.2
December	24,447	7.0	37,526	11.2	22,408	8.3
2008						
January	40,005	11.4	32,672	9.7	33,361	12.3
February	34,002	9.7	20,598	6.1	32,298	11.9
March	24,723	7.1	21,415	6.4	24,997	9.2
April	28,812	8.2	24,405	7.3	25,332	9.3

(Figure 2). For example, prior to deployment, approximately one of 40 (2.5%) deployers rated their health as "fair" or "poor"; however, 3-6 months after returning from deployment (during post-deployment reassessments), approximately one of seven (13.8%) respondents rated their health as "fair" or "poor" **(Figure 2).**

During the past 12 months, the proportion of deployers who assessed their general health as "fair" or "poor" before deploying remained consistently low (% "fair" or "poor" "health in general," pre-deployment health assessments, May 2007-April 2008, by month: mean: 2.5% [range: 1.8-3.3%]) **(Figure 3).** The proportion of redeployers who assessed their general health as "fair" or "poor" around times of return from deployment was consistently and clearly higher than before deploying (% "fair" or "poor" "health in general," post-deployment health assessments, May 2007-April 2008, by month: mean: 6.6% [range: 4.2-7.7%]) **(Figure 3).** Finally, the proportion of redeployers who assessed their general health as "fair" or "poor" 3-6 months after redeploying was sharply higher than at redeployment (% "fair" or "poor" "health in general," post-deployment health reassessments, January 2006-December 2007, by month: mean: 13.4% [range: 11.3-16.9%]) **(Figure 3).**

More than half of service members who rated their overall health before deployment chose a different descriptor after deploying, but usually by a single category (on a five category scale). The proportions of deployers whose self-rated health improved by more than one category from pre-deployment to reassessment remained relatively stable between May 2007 and April 2008 (mean: 1.4%, range:1.0-1.7%) **(Figure 4).** The proportions of service members whose self-assessed health declined by more than one category was relatively stable between May and September 2007 and has generally increased since September 2007 (mean: 16.0, range 13.6-18.8%) **(Figure 4).**

In general, on post-deployment assessments and reassessments, members of Reserve components and members of the Army were much more likely than their respective counterparts to report mental health-related symptoms and health and exposure-related concerns – and in turn, to have indications for medical and mental health follow-ups ("referrals") **(Table 2).**

Among Reserve versus active component members, relative excesses of health-related concerns and provider-indicated

Figure 2. Percent distributions of self-assessed health status as reported on deployment health assesment forms, U.S. Armed Forces, May 2007-April 2008

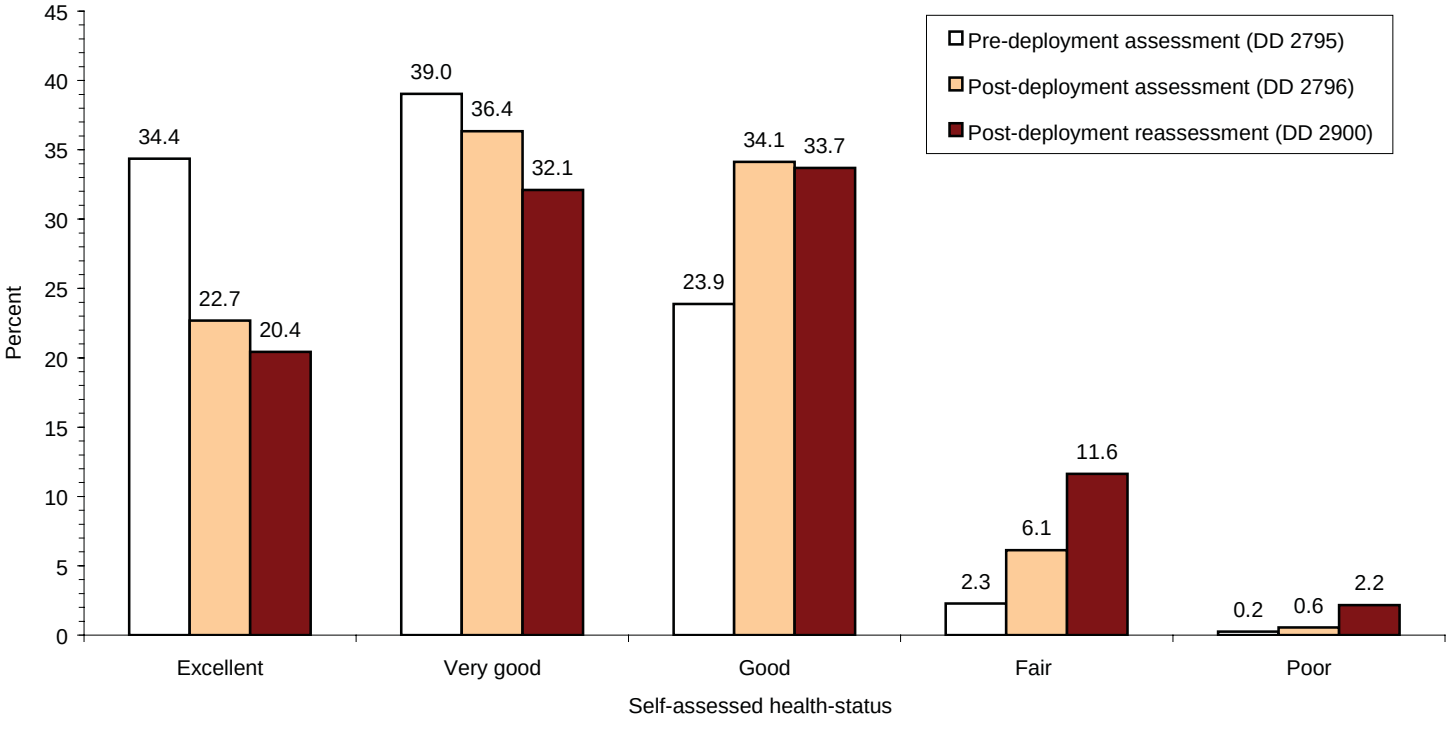
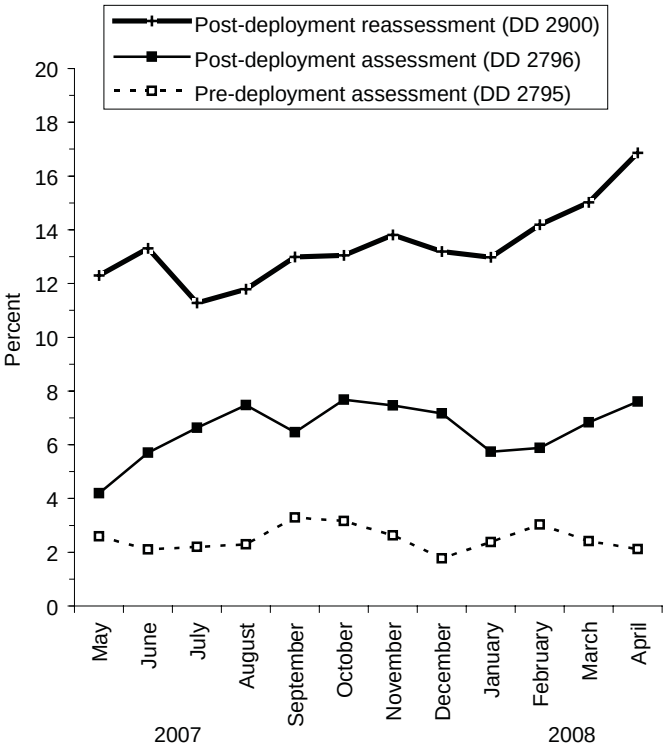


Figure 3. Proportion of deployment health assessment forms with self-assessed health status as "fair" or "poor", U.S. Armed Forces, May 2007-April 2008



referrals were much greater 3-6 months after redeployment (DD2900) than either before deploying (DD2795) or at redeployment (DD2796) **(Table 2, Figures 5,6).** For example, among both active and Reserve component members of all Services, mental or behavioral health referrals were more common after deployment than before **(Figure 5).** However, from the time of redeployment to 3-6 months later, mental health referrals sharply increased among Reserve component members of the Army, Navy, and Marine Corps (but not Air Force) **(Table 2, Figure 5).** Of note in this regard, the largest absolute increase in mental health referrals from redeployment to 3-6 months later was for Reserve component members of the Army (post-deployment: 4.8%; reassessment: 11.4%) **(Table 2, Figure 5).**

Finally, over the past three years, Reserve component members have been approximately twice as likely as active to report "exposure concerns" on post-deployment health assessments (DD2796) (%"exposure concerns," post-deployment assessments, by month, May 2007-April 2008: Reserve: mean: 26.6%, range: 22.2-32.6%; active: mean: 15.5%; range: 9.6-18.7%) **(Table 2, Figures 6,7).** Sharply higher proportions of both Reserve and active component members endorsed exposure concerns 3-6 months after (DD2900) compared to around times (DD2796) of redeployment (%"exposure concerns," post-deployment reassessments, by month, March 2007-February 2008: Reserve: mean: 35.5%, range: 31.0-39.7%; active: mean: 20.8%; range: 18.3-24.8%) **(Figure 7).**

Editorial comment:

In general, since 2003, proportions of U.S. deployers to Iraq and Afghanistan who report medical or mental health-related symptoms (or have indications for medical or mental health referrals) on deployment-related health assessments increased from pre-deployment to post-deployment to 3-6 months post-deployment, are higher among members of the Army than the other Services, and are higher among Reserve than the active component members.

Regardless of the Service or component, deployers often rate their general health worse when they return compared to before deploying. This is not surprising because deployments are inherently physically and psychologically demanding. Clearly, there are many more – and more significant – threats to the physical and mental health of service members when they are conducting or supporting combat operations away from their families in hostile environments compared to when serving at their permanent duty stations (active component) or when living in their civilian communities (Reserve component).

However, many redeployed service members rate their general health worse 3-6 months after returning from deployment compared to earlier. This finding may be less intuitively understandable. Symptoms of post-traumatic stress disorder (PTSD) may emerge or worsen within several months after a life threatening experience (such as military service in a war zone). PTSD among U.S. veterans of combat duty in Iraq has been associated with higher rates of physical health problems after redeployment.[4] The post-deployment health reassessment at 3-6 months post-deployment is designed to detect service members with symptoms not only of PTSD but also persistent or emerging deployment-related medical and mental health problems.

Among British veterans of the Iraq war, Reservists reported more "ill health" than their active counterparts.[5] Roles, traumatic experiences, and unit cohesion while deployed were associated with medical outcomes after redeployment; however, PTSD symptoms were more associated with problems at home (e.g., reintegration into family, work, and other aspects of civilian life) than with events in Iraq.[5] The finding may explain, at least in part, the large differences in prevalences of mental health symptoms, medical complaints, and provider-indicated mental health referrals among Reserve compared to active members — particularly in the Army and Navy — 3-6 months after returning from deployment compared to earlier.

Post-deployment health assessments may be more reliable several months after redeployment compared to earlier. Commanders, supervisors, family members, peers, and providers of health care to redeployed service members should be alert to emerging or worsening symptoms of physical and psychological problems for several months, at least, after returning from deployment.

Figure 4. Proportion of service members whose self-assessed health status improved ("better") or declined ("worse") (by 2 or more categories on 5 category scale) from pre-deployment to reassessment, by month, U.S. Armed Forces, May 2007-April 2008

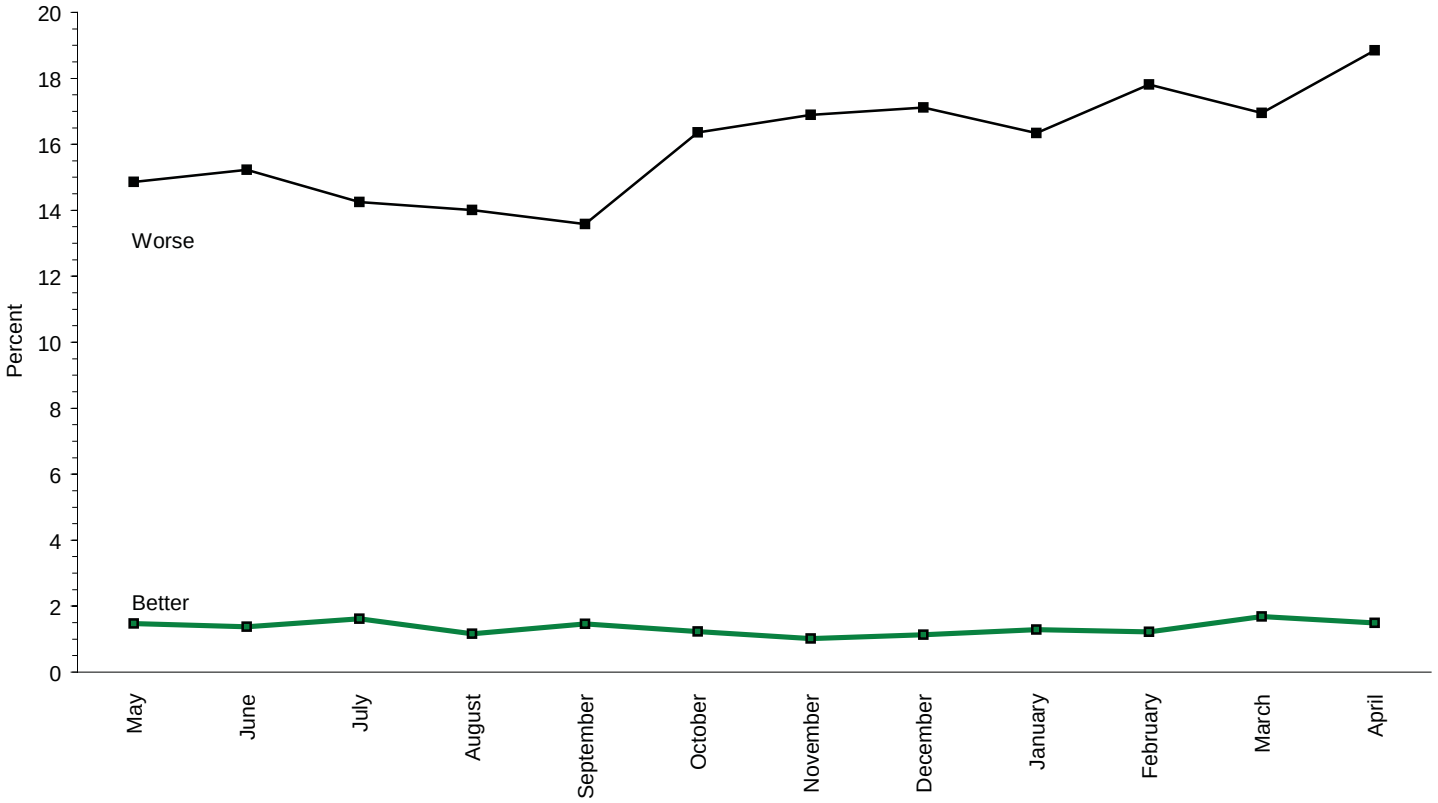


Figure 5. Percent of deployers with mental or behavioral health referrals, by Service and component, by timing of health assessment, U.S. Armed Forces, May 2007-April 2008

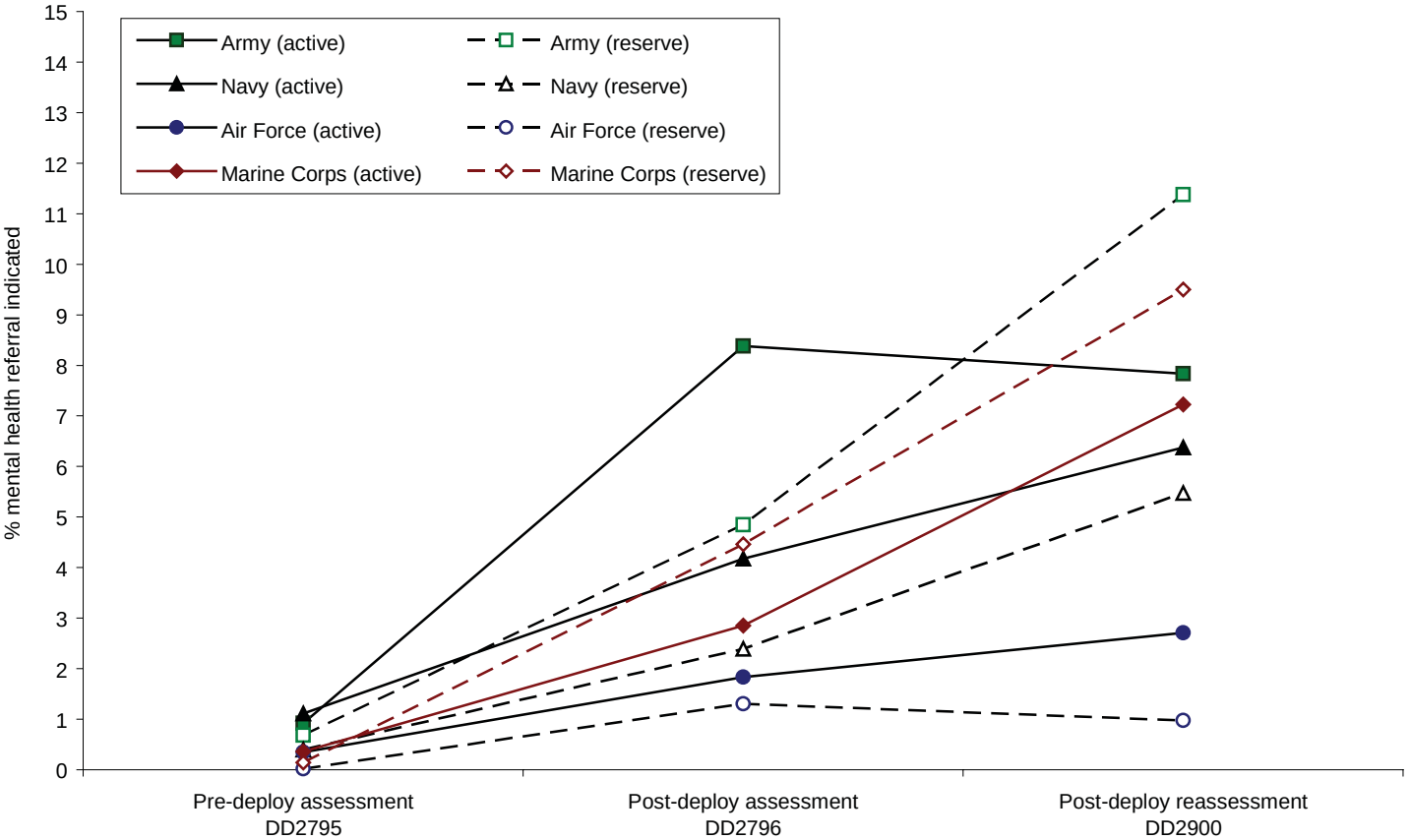


Table 2. Percentage of service members who endorsed selected questions/received referrals on health assessment forms, U.S. Armed Forces, May 2007-April 2008

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
Active component	n=136,770	n=153,067	n=77,629	n=18,296	n=10,487	n=6,930	n=62,518	n=55,608	n=49,643	n=38,048	n=26,639	n=37,252	n=255,632	n=245,801	n=171,454
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health “fair” or “poor”	4.3	8.2	17.5	1.7	4.0	7.3	0.5	2.1	4.8	2.1	3.0	10.6	2.8	6.1	11.9
Health concerns, not wound or injury	13.7	28.2	40.8	5.7	11.8	25.1	4.4	15.0	17.1	4.3	8.6	30.6	9.4	22.4	31.1
Health worse now than before deployed	0.0	23.0	28.2	0.0	10.1	16.1	0.0	8.2	10.1	0.0	11.0	20.9	0.0	17.8	20.9
Exposure concerns	0.0	21.1	25.7	0.0	12.2	15.8	0.0	6.7	14.1	0.0	7.4	22.2	0.0	16.0	21.2
PTSD symptoms (2 or more)	0.0	17.8	18.8	0.0	5.1	10.5	0.0	2.8	3.5	0.0	5.4	13.1	0.0	12.5	12.8
Depression symptoms (any)	0.0	33.7	36.6	0.0	19.1	28.7	0.0	9.2	14.9	0.0	23.6	34.1	0.0	26.4	29.5
Referral indicated by provider (any)	6.1	32.3	24.0	6.9	21.8	24.5	1.7	11.6	10.0	4.7	14.8	29.4	4.9	25.3	21.1
Mental health referral indicated*	0.9	8.4	7.8	1.1	4.2	6.4	0.4	1.8	2.7	0.4	2.9	7.2	0.7	6.1	6.2
Medical visit following referral†	95.8	99.2	98.1	86.9	89.4	94.9	75.4	93.7	95.3	68.0	67.2	90.4	91.2	94.9	95.7

	Army			Navy			Air Force			Marine Corps			All service members		
	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900	Pre-deploy DD2795	Post-deploy DD2796	Reassessmt DD2900
Reserve component	n=68,804	n=71,648	n=76,154	n=4,813	n=3,219	n=5,386	n=16,405	n=14,262	n=14,736	n=4,115	n=1,277	n=3,495	n=94,137	n=90,406	n=99,771
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
General health “fair” or “poor”	2.1	9.9	19.3	0.6	4.3	8.7	0.3	2.0	4.6	1.9	5.0	11.9	1.7	8.4	16.3
Health concerns, not wound or injury	16.5	38.7	56.6	3.2	23.7	38.3	2.0	22.7	19.3	4.9	17.7	44.3	12.8	35.4	49.6
Health worse now than before deployed	0.0	29.3	38.1	0.0	18.7	23.8	0.0	11.9	11.1	0.0	20.2	27.0	0.0	26.1	33.0
Exposure concerns	0.0	31.2	39.5	0.0	31.3	28.8	0.0	9.2	19.8	0.0	16.8	28.2	0.0	27.5	35.6
PTSD symptoms (2 or more)	0.0	14.1	24.6	0.0	4.6	12.9	0.0	1.9	3.4	0.0	4.9	20.0	0.0	11.7	20.7
Depression symptoms (any)	0.0	28.7	39.6	0.0	16.8	26.8	0.0	8.0	14.8	0.0	30.6	36.3	0.0	25.1	35.2
Referral indicated by provider (any)	9.0	30.7	38.6	5.2	19.7	26.3	0.3	11.3	13.3	5.2	33.6	40.4	7.2	27.3	34.2
Mental health referral indicated*	0.7	4.8	11.4	0.4	2.4	5.5	0.0	1.3	1.0	0.1	4.5	9.5	0.5	4.2	9.5
Medical visit following referral†	96.1	96.2	26.6	93.5	79.9	29.0	56.7	56.8	25.3	46.1	82.1	23.1	94.1	93.5	26.4

*Includes behavioral health, combat stress and substance abuse referrals
†Record of inpatient or outpatient visit within 6 months after referral

References:

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2. Assistant Secretary of Defense (Health Affairs). Memorandum for the Assistant Secretaries of the Army (M&RA), Navy (M&RA), and Air Force (M&RA), subject: Post-deployment health reassessment (HA policy: 05-011), dated 10 March 2005. Washington, DC. http://www.ha.osd.mil/policies/2005/05-011.pdf. Accessed 18 October 2006.
3. Rubertone MV, Brundage JG. The Defense Medical Surveillance System and the Department of Defense Serum Repository: Glimpses of the Future of Public Health Surveillance. *Am J Public Health* 2002 Dec;92,(12):1900-04.
4. Hoge CW, Terhakopian A, Castro CA, Messer SC, Engel CC. Association of posttraumatic stress disorder with somatic symptoms, health care visits, and absenteeism among Iraq war veterans. *Am J Psychiatry*. 2007 Jan;164(1):150-3.
5. Browne T, Hull L, Horn O, et al. Explanations for the increase in mental health problems in UK reserve forces who have served in Iraq. *Br J Psychiatry*. 2007 Jun;190:484-489.

Figure 6. Ratio of percents of deployers who endorse selected questions, Reserve versus active component, on pre-deployment health assessments (DD2795) and post-deployment health reassessments (DD2900), U.S. Armed Forces, May 2007-April 2008

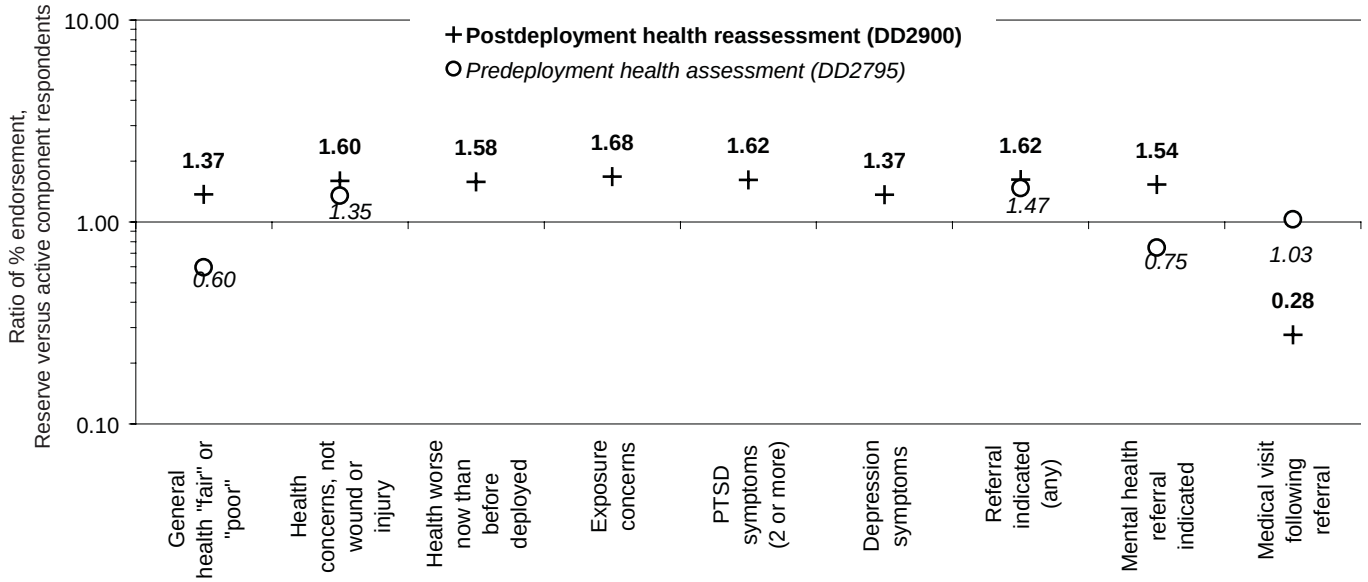
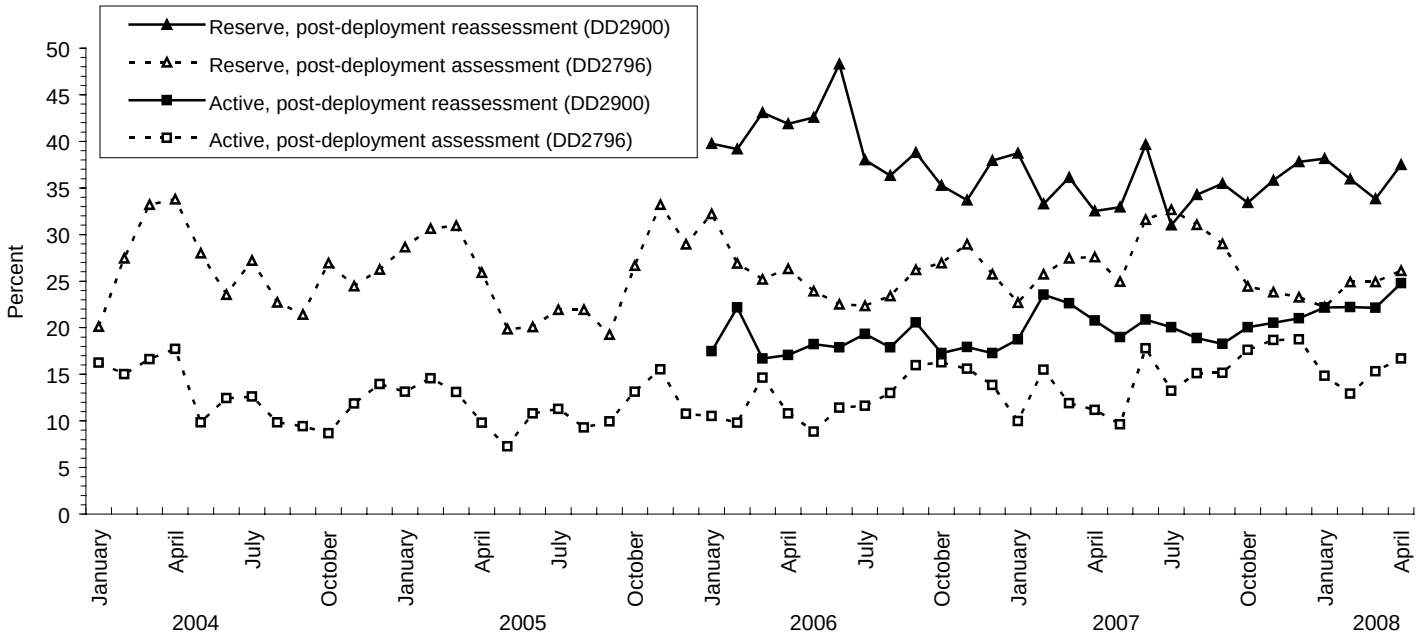


Figure 7. Proportion of service members who endorse exposure concerns on post-deployment health assessments, U.S. Armed Forces, January 2003-April 2008



Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers* through April 2007 and April 2008

Army

Reporting location	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NORTH ATLANTIC	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC Area	49	91	.	.	2	1	.	.	.	.	.	.	1	.	1	4
Aberdeen, MD	2	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	40	43	2	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Bragg, NC	214	304	1	.	.	.	2	2	.	.	.	.	.	.	.	.
FT Drum, NY	54	73	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Eustis, VA	31	270	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Knox, KY	50	241	.	1	.	.	1	.	.	.	.	.	1	.	.	.
FT Lee, VA	87	72	.	.	.	.	.	.	.	.	.	.	1	.	.	.
FT Meade, MD	4	123	.	.	.	.	.	.	.	.	.	.	.	.	.	.
West Point, NY	7	9	.	.	.	.	.	.	.	.	.	.	3	.	.	.
GREAT PLAINS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Sam Houston, TX	136	241	.	.	.	.	.	1	.	1	.	.	.	.	.	.
FT Bliss, TX	0	104	.	.	.	.	.	1	.	.	.	.	.	.	.	.
FT Carson, CO	159	194	.	.	2	.	.	1	.	.	.	.	.	.	.	.
FT Hood, TX	285	220	2	.	.	.	.	3	2	1	.	.	.	.	.	.
FT Huachuca, AZ	23	10	.	.	.	.	5	.	.	.	.	.	.	.	.	.
FT Leavenworth, KS	1	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	77	232	.	.	.	1	.	1	.	.	.	.	.	1	2	.
FT Polk, LA	31	28	.	.	1	.	1	.	.	.	.	.	.	.	.	1
FT Riley, KS	75	165	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Sill, OK	34	77	.	.	.	.	1	.	.	.	.	.	.	.	1	.
SOUTHEAST	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Gordon, GA	142	251	.	.	.	.	.	1	.	.	.	.	.	.	.	.
FT Benning, GA	90	71	.	.	1	.	.	.	.	.	.	.	1	.	1	.
FT Campbell, KY	127	74	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Jackson, SC	25	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Rucker, AL	6	12	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Stewart, GA	172	144	1	.	.	1	1	2	3	.	.	.	1	2	1	.
WESTERN	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Lewis, WA	84	191	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Irwin, CA	14	7	1	.	.	.	1	1	.	.	.	.	.	.	.	.
FT Wainwright, AK	29	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
OTHER LOCATIONS	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hawaii	118	154	2	4	.	1	2	3	.	.	.	.	.	.	.	.
Germany	88	333	3	3	1	1	2	1	.	.	.	.	.	4	1	.
Korea	98	98	.	.	.	.	.	.	.	.	.	.	.	.	2	1
Total	**2,352**	**3,869**	**12**	**8**	**7**	**5**	**16**	**17**	**5**	**2**	**0**	**0**	**8**	**7**	**9**	**6**

*Events reported by May 7, 2007 and May 7, 2008

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Army medical facilities, cumulative numbers* through April 2007 and April 2008

Army

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NORTH ATLANTIC																
Washington, DC Area	1	1	.	.	39	38	3	15	2	3	.	.	.	.	.	.
Aberdeen, MD	.	.	.	.	8	.	3	.	.	.	.	.	.	.	.	.
FT Belvoir, VA	.	.	.	.	45	54	7	1	2	.	.	.	.	.	.	.
FT Bragg, NC	.	.	1	.	305	352	51	66	.	1	37	24	1	.	5	1
FT Drum, NY	.	3	.	.	52	90	11	10	.	.	.	.	.	.	.	.
FT Eustis, VA	.	.	.	.	57	77	2	11	.	2	.	.	.	.	1	.
FT Knox, KY	.	.	.	.	84	60	11	15	.	.	.	.	.	.	.	.
FT Lee, VA	.	1	.	.	124	79	21	35	.	1	.	.	1	.	.	.
FT Meade, MD	.	1	.	.	8	25	3	1	.	.	.	.	1	.	.	.
West Point, NY	2	5	.	.	5	11	.	.	.	.	.	.	.	.	.	.
GREAT PLAINS																
FT Sam Houston, TX	.	.	.	.	120	96	14	27	2	10	.	.	.	1	.	.
FT Bliss, TX	.	.	.	.	11	118	1	25	.	.	.	.	.	.	.	.
FT Carson, CO	.	.	.	.	158	186	28	18	1	.	5	10	1	.	.	.
FT Hood, TX	.	.	.	.	389	521	56	98	1	.	31	31	.	.	.	.
FT Huachuca, AZ	.	.	.	.	36	26	4	3	.	.	.	.	.	.	.	.
FT Leavenworth, KS	.	.	.	.	11	16	1	.	.	.	.	.	.	.	.	.
FT Leonard Wood, MO	.	.	.	.	90	75	17	8	1	.	.	.	2	3	.	.
FT Polk, LA	.	.	10	.	40	36	8	15	1	.	.	.	.	.	.	.
FT Riley, KS	.	1	.	1	73	122	3	7	.	.	.	.	.	1	.	.
FT Sill, OK	.	.	.	.	53	37	11	8	.	.	.	.	1	.	.	.
SOUTHEAST																
FT Gordon, GA	.	.	.	.	181	180	28	55	1	.	.	.	.	.	.	.
FT Benning, GA	.	.	1	.	49	91	23	26	.	1	.	.	.	.	.	1
FT Campbell, KY	.	.	.	.	.	51	.	2	.	1	.	.	.	.	.	.
FT Jackson, SC	.	.	.	.	52	63	9	10	2	.	.	.	.	.	.	.
FT Rucker, AL	.	1	.	.	13	22	1	7	.	.	.	.	.	.	.	.
FT Stewart, GA	.	.	.	1	260	210	53	33	1	1	.	.	.	.	1	.
WESTERN																
FT Lewis, WA	.	.	1	.	162	302	17	30	.	1	5	8	.	.	.	.
FT Irwin, CA	.	.	.	.	17	17	1	3	.	.	.	.	.	.	.	.
FT Wainwright, AK	.	1	.	.	33	104	3	13	.	.	.	.	10	11	.	.
OTHER LOCATIONS																
Hawaii	.	.	.	.	193	208	21	28	.	.	.	.	.	.	2	.
Germany	5	13	2	4	119	313	40	72	.	3	1	.	.	8	1	.
Korea	.	.	.	.	142	204	12	24	.	3	1	.	20	.	.	.
Total	**8**	**27**	**15**	**6**	**2,929**	**3,784**	**463**	**666**	**14**	**27**	**80**	**73**	**37**	**24**	**10**	**2**

‡Primary and secondary.
§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers* through April 2007 and April 2008

Navy

Reporting location	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NATIONAL CAPITOL AREA																
Annapolis, MD	0	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bethesda, MD	15	11	.	.	.	.	.	1	.	.	.	.	.	1	.	.
Patuxent River, MD	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	0	3	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Atlanta, GA	3	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Beaufort, SC	73	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Camp Lejeune, NC	79	20	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Cherry Point, NC	42	30	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Great Lakes, IL	102	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Jacksonville, FL	79	16	1	.	.	.	1	2	1	.	.	.	.	.	.	.
Mayport, FL	23	16	1	.	.	.	4	3	.	.	.	.	.	.	.	.
NABLC Norfolk, VA	21	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	115	77	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NEHC Norfolk, VA	2	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
North Charleston, SC	3	11	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Pensacola, FL	33	13	.	.	.	.	1	.	1	1	.	.	.	.	3	.
Portsmouth, VA	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	0	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Europe	11	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	10	8	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Corpus Christi, TX	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fallon, NV	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	1	9	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	213	10	1	.	2	.	2	.	2	1	.	.	28	.	.	.
Guam	18	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Japan	23	4	.	.	.	.	.	.	.	.	.	.	.	.	1	.
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	4	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	17	0	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Total	**891**	**248**	**3**	**0**	**2**	**1**	**8**	**8**	**5**	**2**	**0**	**0**	**28**	**3**	**5**	**1**

*Events reported by May 7, 2008

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

Sentinel reportable events for service members and beneficiaries at U.S. Navy medical facilities, cumulative numbers* through April 2007 and April 2008

Navy

Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
NATIONAL CAPITOL AREA																
Annapolis, MD	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.
Bethesda, MD	.	.	.	1	12	2	.	1	.	.	.	.	.	.	.	.
Patuxent River, MD	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE EAST																
Albany, GA	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Atlanta, GA	.	.	.	.	1	.	1	.	1	.	.	.	.	.	.	.
Beaufort, SC	.	.	.	.	61	.	4	.	1	.	.	.	.	.	.	.
Camp Lejeune, NC	1	.	.	.	69	11	6	2	.	.	.	4	.	.	3	1
Cherry Point, NC	.	.	.	.	36	15	4	3	1	.	.	.	.	.	.	.
Great Lakes, IL	.	.	.	.	89	.	10	.	.	.	.	.	.	.	.	.
Jacksonville, FL	.	.	.	.	63	6	8	.	1	.	.	.	.	.	.	.
Mayport, FL	.	.	.	.	15	8	.	2	1	.	.	.	.	.	.	.
NABLC Norfolk, VA	.	.	.	.	20	3	1	.	.	.	.	.	.	.	.	.
NBMC Norfolk, VA	.	.	.	.	100	64	15	9	.	.	.	.	.	.	.	.
NEHC Norfolk, VA	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
North Charleston, SC	.	.	.	.	3	6	.	.	.	1	.	.	.	.	.	.
Pensacola, FL	.	.	.	.	20	7	2	.	.	.	.	.	.	.	2	.
Portsmouth, VA	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Washington, DC	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
Guantanamo Bay, Cuba	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Europe	.	.	.	1	11	1	.	.	.	.	.	.	.	.	.	.
NAVY MEDICINE WEST																
Camp Pendleton, CA	.	.	.	.	8	6	1	.	1	.	.	.	.	.	.	.
Corpus Christi, TX	.	.	.	.	2	.	1	1	.	.	.	.	.	.	.	.
Fallon, NV	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Ingleside, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lemoore, CA	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
Pearl Harbor, HI	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
San Diego, CA	1	.	.	.	119	8	22	1	3	.	.	.	.	.	.	.
Guam	.	.	.	.	16	.	2	.	.	.	.	.	.	.	.	.
Japan	.	.	.	.	16	2	4	.	.	.	.	.	.	.	1	.
NAVAL SHIPS																
COMNAVAIRLANT/CINCLANTFLEET	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.
COMNAVSURFPAC/CINCPACFLEET	.	.	.	.	11	.	5	.	.	.	.	.	.	.	.	.
Total	**2**	**0**	**0**	**2**	**679**	**150**	**86**	**19**	**9**	**1**	**0**	**4**	**0**	**0**	**6**	**1**

‡Primary and secondary.

§Urethritis, non-gonococcal (NGU).

Sentinel reportable events for service members and beneficiaries at U.S. Air Force medical facilities, cumulative numbers* through April 2007 and April 2008

Air Force

Reporting location	Number of reports all events†		Food-borne								Vaccine preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Air Combat Cmd	656	671	1	1	1	2	.	1	.	3	.	.	3	12	4	2
206	206	355	.	.	.	1	2	1	.	.	.	.	2	1	1	1
Lackland, TX	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	19	9	.	.	.	.	2	.	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	8	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	166	276	.	1	.	.	3	.	.	1	.	.	.	.	1	.
Air Force Special Ops Cmd	42	61	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Air Force Space Cmd	112	182	1	.	2	.	5	2	.	.	.	.	1	.	1	1
Air Mobility Cmd	238	376	.	.	.	1	1	1	2	.	.	.	3	2	1	4
Pacific Air Forces	175	170	.	4	.	2	1	1	.	.	.	.	2	2	7	2
PACAF Korea	57	73	.	.	.	.	.	.	.	.	.	.	4	.	.	.
U.S. Air Forces in Europe	115	144	2	1	.	.	.	.	1	.	.	.	.	.	.	1
Total	**1,794**	**2,324**	**4**	**7**	**3**	**6**	**14**	**6**	**4**	**4**	**0**	**0**	**15**	**17**	**15**	**11**

*Events reported by May 7, 2008

†Seventy medical events/conditions specified by Tri-Service Reportable Events Guidelines and Case Definitions, May 2004.

Note: Completeness and timeliness of reporting vary by facility.

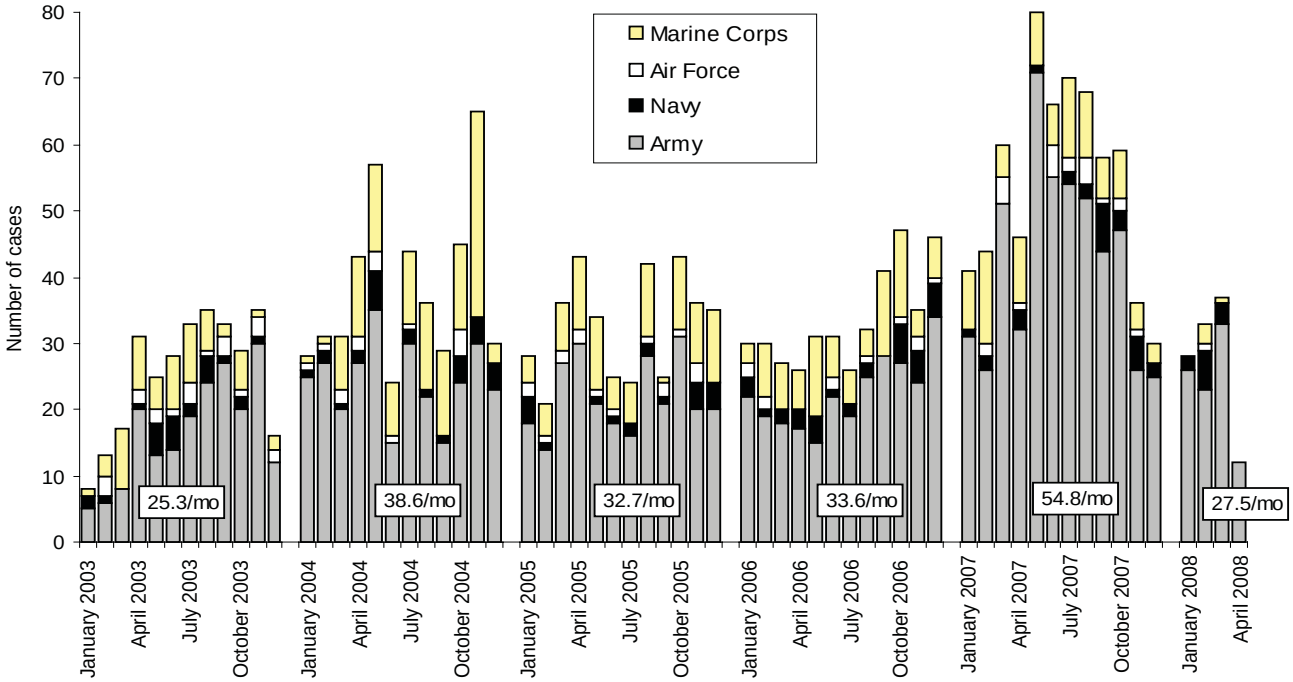
Reporting location	Arthropod-borne				Sexually transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis‡		Urethritis§		Cold		Heat	
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Air Combat Cmd	2	.	.	.	329	292	26	16	.	.	.	1	.	1	2	.
Air Education & Training Cmd	.	1	.	.	161	150	14	10	.	.	.	.	.	.	.	.
Lackland, TX	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
USAF Academy, CO	.	.	.	.	17	9	.	.	.	.	.	.	.	.	.	.
Air Force Dist. of Washington	.	.	.	.	8	2	.	.	.	.	.	.	.	.	.	.
Air Force Materiel Cmd	.	2	.	.	135	134	16	12	.	2	.	.	.	.	.	.
Air Force Special Ops Cmd	.	1	.	.	37	48	4	5	.	.	.	.	.	.	.	.
Air Force Space Cmd	.	1	.	.	88	104	9	5	.	.	.	.	.	.	.	.
Air Mobility Cmd	2	2	.	.	194	216	16	26	1	1	.	.	.	2	1	.
Pacific Air Forces	.	.	.	.	140	131	4	8	.	.	.	.	1	.	.	.
PACAF Korea	.	.	.	.	39	49	1	3	2	.	.	.	2	.	.	.
U.S. Air Forces in Europe	1	.	.	1	75	104	9	10	.	.	.	.	.	.	.	.
Total	**5**	**7**	**0**	**1**	**1,223**	**1,239**	**99**	**95**	**3**	**3**	**0**	**1**	**3**	**3**	**3**	**0**

‡Primary and secondary.

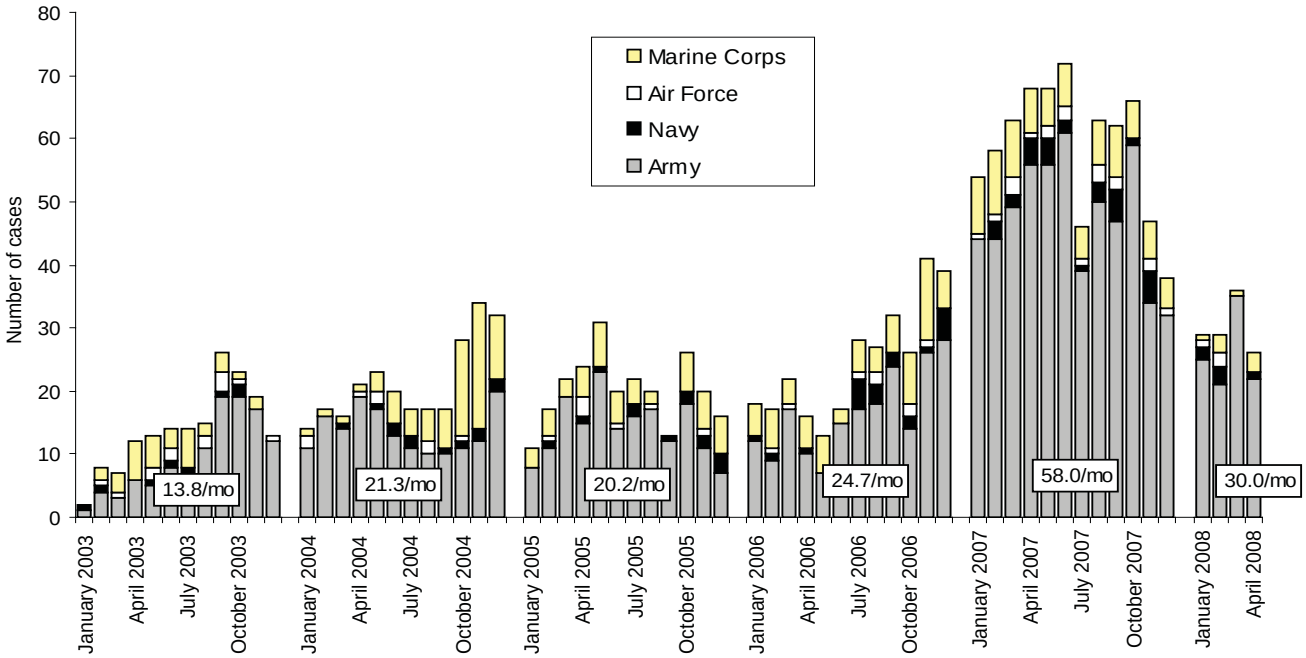
§Urethritis, non-gonococcal (NGU).

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-April 2008

Traumatic brain injury, hospitalizations (ICD-9: 800-804, 850-854, 959.01)*



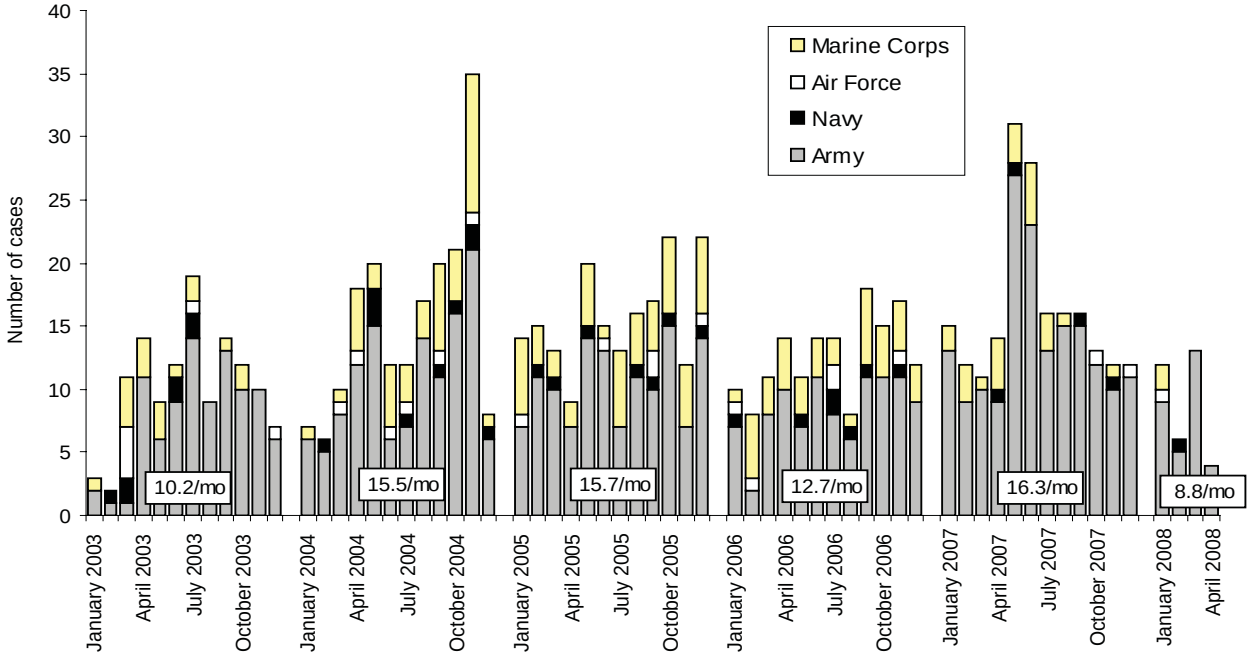
Traumatic brain injury, multiple ambulatory visits (without hospitalization), (ICD-9: 800-804, 850-854, 959.01)†



Reference: Army Medical Surveillance Activity. Traumatic brain injury among members of active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):2-6.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.
†Two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

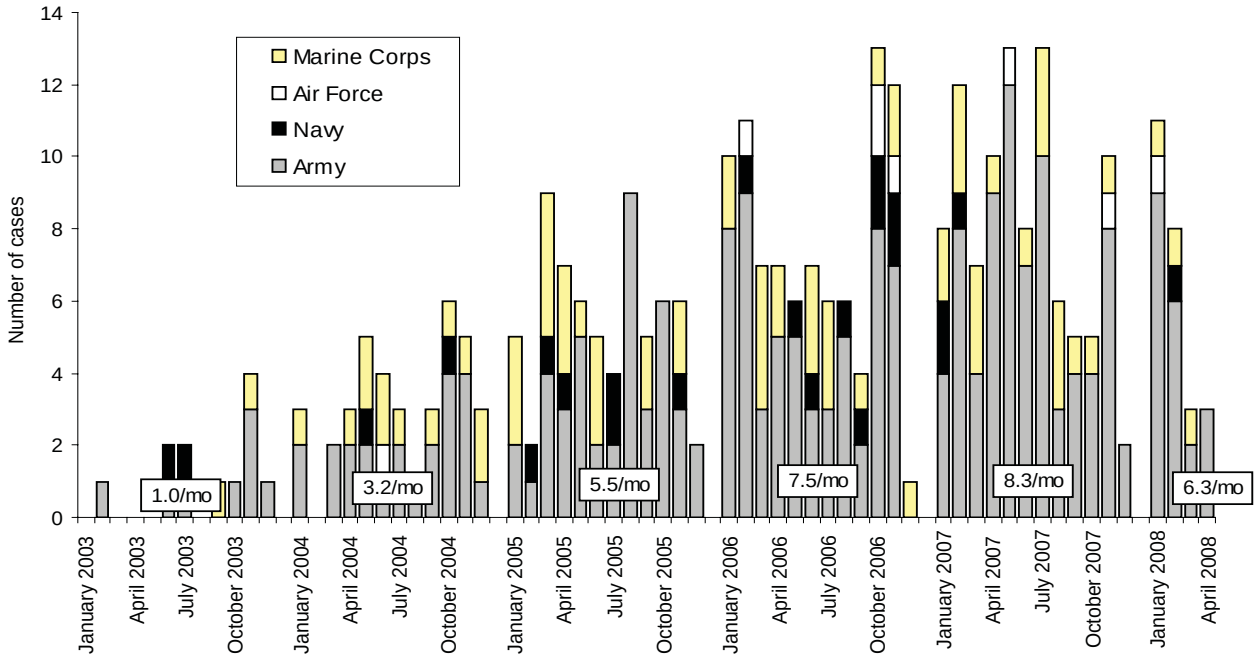
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-April 2008

Amputations (ICD-9: 887, 896, 897, V49.6 to V49.7, PR 84.0 to PR 84.1)*



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.
*Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 365 days of returning from OEF/OIF.

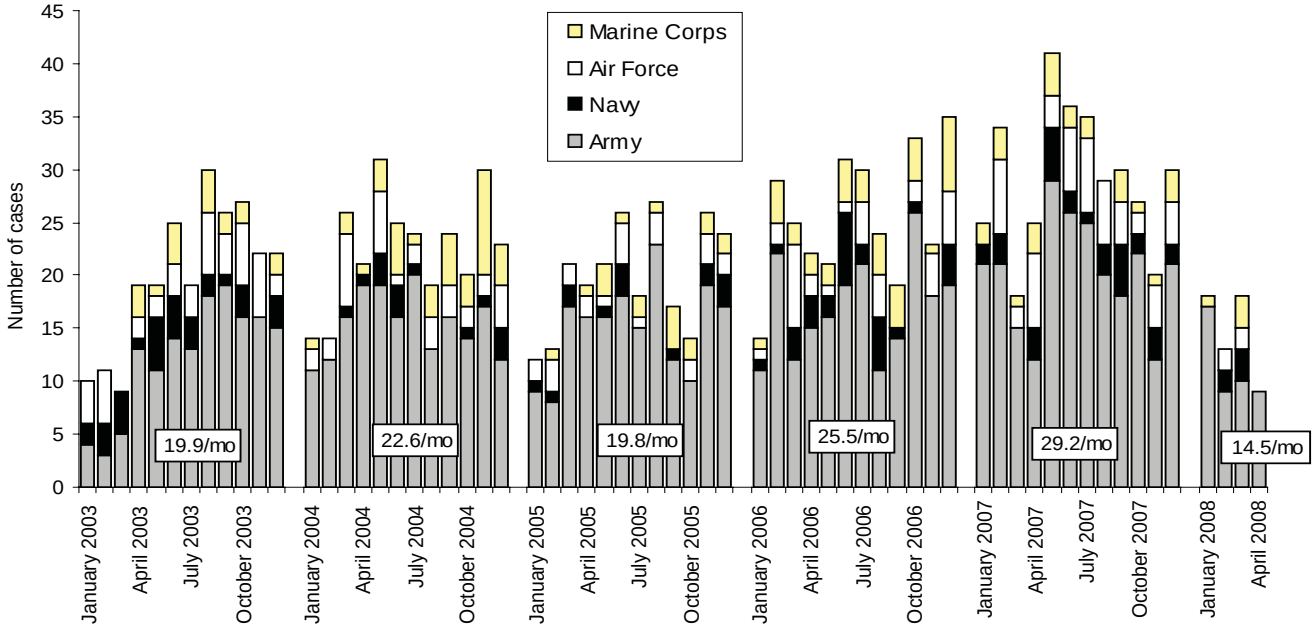
Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)†



Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.
†One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart while deployed to/within 365 days of returning from OEF/OIF.

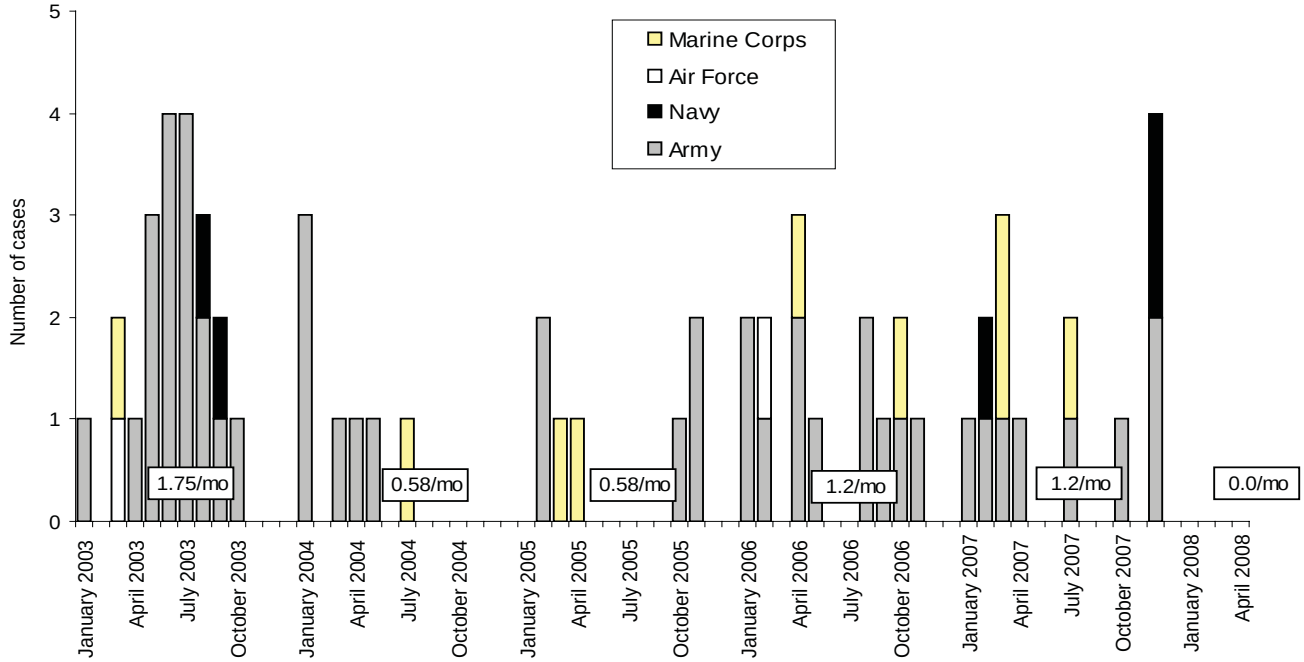
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-April 2008

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 to 453.42 and 453.8)*



Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*.2006;117(4):379-83.
*Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 90 days of returning from OEF/OIF.

Severe acute pneumonia (ICD-9: 518.81, 518.82, 518.3, 480-487, 786.09)†



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: severe acute pneumonia. Hospitalizations for acute respiratory failure (ARF)/acute respiratory distress syndrome (ARDS) among participants in Operation Enduring Freedom/Operation Iraqi Freedom, active components, U.S. Armed Forces, January 2003-November 2004. *MSMR*. Nov/Dec 2004;10(6):6-7.
†Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF.

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